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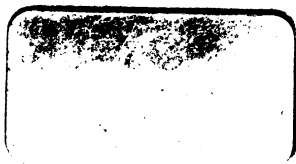
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THE YEAR-BOOK  
FOR  
COLORISTS AND DYERS

Presenting a Review of the Year's  
Advances in the Bleaching, Dyeing,  
Printing, and Finishing of Textiles.

BY  
HERMAN A. METZ

VOLUME VI

NEW YORK 1903

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## **PREFACE.**

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In this, the sixth volume of the Year-Book for Colorists and Dyers, the author has compiled most of the novelties for the year 1903. He trusts that it will be found useful and worthy of the same approval as the former volumes.

**HERMAN A. METZ.**

**122 HUDSON STREET,  
NEW YORK CITY, MARCH, 1904.**



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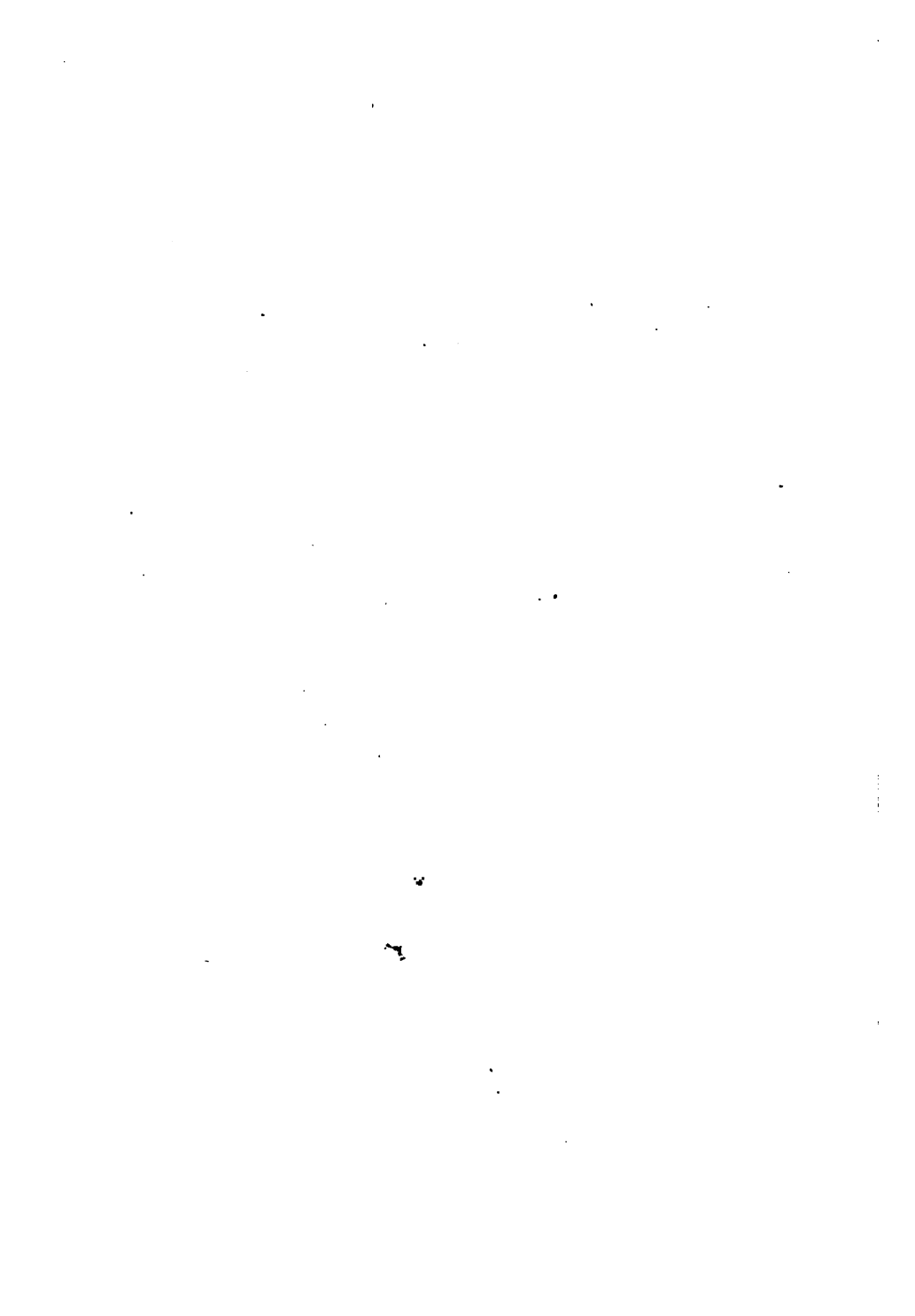
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PART I.



TABLES.





PART I.



T A B L E S.

*Linear, or Long, Measure.*

	Meters	Inches.	Feet.	Yards.	Miles.
Millimeter.....	.001	.09937	.00328	.00109	-----
Centimeter.....	.01	.3937	.0328	.01093	-----
Decimeter.....	.1	3.937	.32806	.10936	.00069
Meter.....	1	39.37	3.28083	1.093611	.00692
Decameter.....	10	-----	32.80833	10.93611	.06921
Hectometer.....	100	-----	328.0833	109.3611	.69218
Kilometer.....	1,000	-----	3,280.833	1,093.611	6.9187
Myriameter.....	10,000	-----	-----	-----	69.187

<sup>1</sup>39.37 inches is the legalized equivalent of the meter in the United States  
The exact equivalent is 39.37079 inches.

*Square Measure.*

	Square Meter..	Square Inches.	Square Feet.	Square Yards.	Acres.
Milliare.....	.1	155	1.0764	.1196	-----
Centiare, or square meter.....	1	1,550	10.764	1.196	-----
Deciare.....	10	-----	107.64	11.96	.0024
Are or square decameter.....	100	-----	1,076.4	119.6	.0247
Decare.....	1,000	-----	-----	1,196	.2471
Hectare.....	10,000	-----	-----	-----	2.471

A square centimeter equals 0.155 square inches, a square decimeter 15.5 square inches, and a square kilometer 0.386 square miles.

*Cubic Measure.*

	Cubic Meters.	Cubic Inches.	Cubic Feet.	Cubic Yards.
Millistere, or cubic decimeter.....	.001	61.023	.035314	-----
Centistere.....	.01	610.23	.35314	.01308
Decistere.....	.1	-----	3.5314	.1308
Stere, or cubic meter.....	1	-----	5.314	1.308
Decastere.....	10	-----	53.14	13.08
Hectostere.....	100	-----	-----	130.8

*Measure of Capacity.*

	Liters.	Fluid Ounces	Quarts.	Gallons.	Bushels.
Milliliter, or cubic centimeter.....	.001	.0338	.00106	-----	-----
Centiliter.....	.01	.338	.01057	.00264	-----
Deciliter.....	.1	3.38	.10567	.02642	.002638
Liter, or cubic decimeter.....	1	33.8	1.0567	.26417	.028377
Decaliter.....	10	338	10.567	2.6417	.283774
Hectoliter.....	100	-----	105.67	26.417	2.83774
Kiloliter.....	1,000	-----	-----	264.17	28.3774
Myrialiter.....	10,000	-----	-----	2,641.7	283.774

A liter of water at its maximum density weighs a kilogram.

*Weight.*

	Grams.	Grains.	Ounces Avoirdupois.	Pounds Avoirdupois.	Tons of 2,240 Pounds.
Milligram .....	.001	.01543	-----	-----	-----
Centigram .....	.01	.15432	-----	-----	-----
Decigram .....	.1	1.54324	.0035	-----	-----
Gram .....	1	15.43236	.0683	.0022	-----
Decagram .....	10	154.32350	.6827	.0220	-----
Hectagram .....	100	1,543.23564	6.8274	.22046	-----
Kilogram .....	1,000	15,432.35689	35.274	2.20462	.000984
Myriagram .....	10,000	-----	-----	22.0462	.00843
Quintal .....	100,000	-----	-----	220.462	.0843
Miller, or tonne.	1,000,000	-----	-----	2,204.62	.843

COMPARISON OF METRIC SYSTEM WITH THE  
UNITED STATES METHOD OF WEIGHTS AND  
MEASURES.

(Arranged in Alphabetical Order.)

Are (100 square meters)=119.6 square yards.

Bushel=2150.42 cubic inches, 35.24 liters.

Centare (1 square meter)=1,550 square inches.

Centigram (1/100 gram)=0.1543 grain.

Centiliter (1/100 liter)=2.71 fluid drams, 0.338 fluid ounce.

Centimeter (1/100 meter)=0.3937 inch.

1 Cubic centimeter =16.23 minims (Apothecaries).

10 " centimeters= 2.71 fluid drams (Apothecaries).

30 " " = 1.01 " ounces " "

100 " " = 3.38 " " "

473 " " =16.00 " " "

500 " " =16.90 " " "

1,000 " " =33.81 " " "

Decigram (1/10 gram)=1.5432 grains.

Decimeter (1/10 meter)=3.937 inches.

Deciliter (1/10 liter)=0.845 gill.

Deka gram (10 grams)=0.3527 ounce.

Dekaliter (10 liters)=9.08 quarts (dry), 2.6418 gallons.

Dekameter (10 meters)=393.7 inches.

Dram (Apothecaries or Troy)=3.9 grams.

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Foot=0.3048 meter, or 30.48 centimeters.

Gallon=4.543 liters.

Gill=0.118295 liter, or 142 cubic centimeters.

Grain (Troy)=0.064804 gram.

Grain=0.0648 gram.

Gram=15.432 grains.

Hectare (10,000 square meters)=2.471 acres.

Hectogram=3.5274 ounces.

Hectoliter (100 liters)=2.838 bushels, or 26.418 gallons.

Hectometer (100 meters)=328 feet 1 inch.

Hundredweight (112 pounds Avoirdupois)=50.8 kilograms.

Inch=0.0254 meter.

Inch=2.54 centimeters.

Inch=25.40 millimeters.

Kilogram=2.2046 pounds, or 35.274 ounces.

Kiloliter (1,000 liters)=1.308 cubic yards, or 264.18 gallons.

Kilometer (1,000 meters)=0.62137 mile (3,280 feet 10 inches).

Liter=1.0567 quarts, 0.264 gallon (liquid), or 0.908 quart (dry).

Meter=39.3704 inches, or 3.28087 feet.

Mile=1.609 kilometers.

Mile=5,280 feet, or 1609.3 meters.

Millier or tonneau=2,204.6 pounds.

Milligram=0.0154 grain.

Millimeter (1/1,000 meter)=0.0394 inch.

Myriagram=22.046 pounds.

Myriameter (10,000 meters)=6.2137 miles.

Noggin or Nog.— $\frac{1}{8}$  of a pint.

Ounce (Avoirdupois)=28.350 grams.

Ounce (fluid)=28.3966 cubic centimeters.

Ounce (Troy or Apothecaries)=31.104 grams.

Peck=9.08 liters.

Pint (liquid)=0.47318 liter (liquid), or 0.568 (dry).

Pound (Avoirdupois)=453.603 grams.

Pound (English)=0.453 kilogram.

Pound (Troy)=373.25 grams.

Quart=1.1352 liters.

Quart (liquid)=0.94636 liter.

Quintal=220.46 pounds.

Scruple (Troy)=1.296008 grams.

Ton=20 hundredweight=2.240 pounds (Avoirdupois) 1016.070 kilograms.

Yard=0.9144 meter.

#### MISCELLANEOUS WEIGHTS.

Barrel of flour=196 pounds.

Barrel of salt=280 pounds.

Bale of cotton (in America)=400 pounds.

Bale of cotton (in Egypt)=90 pounds.

Bag of Sea Island cotton=300 pounds.

Cable=120 fathoms.

Can=35 pounds.

Cask of lime=240 pounds.

Fathom=6 feet.

Hand=4 inches.

Hogshead=63 gallons.

Keg (nails)=100 pounds.

Pace=3.3 feet.

Palm=3 inches.

Pipe=2 hogsheads.

Stone=14 pounds.

Tun=2 pipes.

Cubic foot of water weighs 62.4 pounds.

Cubic foot of water is 7.48 gallons

Gallon of water weighs 8 1-3 pounds.

Gallon of water is 231 cubic inches.

In England, wool is sold by the sack, or boll, of 22 stones, which, at 14 pounds to the stone, is 308 pounds.

A pack of wool is 17 stones and 2 pounds which is rated as a pack load for a horse. It is 240 pounds.

Sack of flour=280 pounds.

A tod of wool is 2 stones of 14 pounds.

A wey of wool is 6¼ tods. Two weys, a sack.

A clove of wool is half a stone.

## TABLE OF MULTIPLES.

Centimeters	$\times 0.3937$	=inches.
Centimeters	$\times 0.0328$	=feet.
Centimeters, cubic,	$\times 0.0338$	=apothecaries' fluid ounces.
Diameter of a circle	$\times 3.1416$	=circumference.
Gallons	$\times 3.785$	=liters.
Gallons	$\times 0.833565$	=imperial gallons.
Gallons, imperial,	$\times 1,199666$	=U. S. gallons.
Gallons	$\times 8.33505$	=pounds of water.
Gallons, imperial,	$\times 10$	=pounds of water.
Gallons, imperial,	$\times 4.54102$	=liters.
Grains	$\times 0.0648$	=grams.
Inches	$\times 0.0254$	=meters.
Inches	$\times 25.4$	=millimeters.
Miles	$\times 1.609$	=kilometers.
Ounces, Troy,	$\times 1.097$	=ounces of avoirdupois.
Ounces, avoirdupois,	$\times 0.9115$	=ounces Troy.
Pounds, avoirdupois	$\times 0.4536$	=kilograms.
Pounds, avoirdupois,	$\times 0.8228572$	=pounds Troy.
Pounds, Troy,	$\times 0.37286$	=kilograms.
Pounds, Troy,	$\times 1.21527$	=pounds avoirdupois.
Radius of a circle	$\times 6.283185$	=circumference.
Square of the radius	$\times 3.1416$	=area.
Square of the circumference of a circle	$\times 0.07958$	=area.

## TABLES.

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## THERMOMETRY.

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
—10	—23.33	83	28.33	176	80.00
—9	—22.78	84	28.89	177	80.56
—8	—22.22	85	29.44	178	81.12
—7	—21.67	86	30.00	179	81.67
—6	—21.11	87	30.56	180	82.23
—5	—20.56	88	31.11	181	82.78
—4	—20.00	89	31.67	182	83.34
—3	—19.44	90	32.22	183	83.89
—2	—18.89	91	32.78	184	84.45
—1	—18.33	92	33.33	185	85.00
0	—17.78	93	33.89	186	85.56
1	—17.22	94	34.44	187	86.12
2	—16.67	95	35.00	188	86.67
3	—16.11	96	35.56	189	87.23
4	—15.56	97	36.11	190	87.78
5	—15.00	98	36.67	191	88.34
6	—14.44	99	37.22	192	88.89
7	—13.89	100	37.78	193	89.45
8	—13.33	101	38.34	194	90.00
9	—12.78	102	38.89	195	90.56
10	—12.22	103	39.45	196	81.12
11	—11.67	104	40.00	197	91.67
12	—11.11	105	40.56	198	92.23
13	—10.56	106	41.12	199	92.78
14	—10.00	107	41.67	200	93.34
15	—9.44	108	42.23	201	93.89
16	—8.89	109	42.78	202	94.44
17	—8.33	110	43.34	203	95.00
18	—7.78	111	43.89	204	95.55
19	—7.22	112	44.45	205	96.11
20	—6.67	113	45.00	206	96.67
21	—6.11	114	45.56	207	97.22
22	—5.56	115	46.22	208	97.78
23	—5.00	116	46.67	209	98.33
24	—4.44	117	47.23	210	98.89
25	—3.89	118	47.78	211	99.44
26	—3.33	119	48.34	212	100.00
27	—2.78	120	48.89	213	100.55
28	—2.22	121	49.45	214	101.11
29	—1.67	122	50.00	215	101.67
30	—1.11	123	50.56	216	102.22
31	—0.56	124	51.12	217	102.78
32	—0.00	125	51.67	218	103.33
33	0.56	126	52.23	219	103.89
34	1.11	127	52.78	220	104.44
35	1.67	128	53.34	221	105.00

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
36	2.22	129	53.89	222	105.55
37	2.78	130	54.45	223	106.11
38	3.33	131	55.00	224	106.67
39	3.89	132	55.56	225	107.22
40	4.44	133	56.12	226	107.78
41	5.00	134	56.67	227	108.33
42	5.56	135	57.23	228	108.89
43	6.11	136	57.78	229	109.44
44	6.67	137	58.34	230	110.00
45	7.22	138	58.89	231	110.55
46	7.78	139	59.45	232	111.11
47	8.33	140	60.00	233	111.67
48	8.89	141	60.56	234	112.22
49	9.44	142	61.12	235	112.78
50	10.00	143	61.67	236	113.33
51	10.56	144	62.23	237	113.89
52	11.11	145	62.78	238	114.44
53	11.67	146	63.34	239	115.00
54	12.22	147	63.89	240	115.55
55	12.78	148	64.45	241	116.11
56	13.33	149	65.00	242	116.67
57	13.89	150	65.56	243	117.22
58	14.44	151	66.12	244	117.78
59	15.00	152	66.67	245	118.33
60	15.56	153	67.23	246	118.89
61	16.11	154	67.78	247	119.44
62	16.67	155	68.34	248	120.00
63	17.22	156	68.89	249	120.55
64	17.78	157	69.45	250	121.11
65	18.33	158	70.00	251	121.67
66	18.89	159	70.56	252	122.22
67	19.44	160	71.12	253	122.78
68	20.00	161	71.67	254	123.33
69	20.56	162	72.23	255	123.89
70	21.11	163	72.78	256	124.44
71	21.67	164	73.34	257	125.00
72	22.22	165	73.89	258	125.55
73	22.78	166	74.45	259	126.11
74	23.33	167	75.00	260	126.67
75	23.89	168	75.56	261	127.22
76	24.44	169	76.12	262	127.78
77	25.00	170	76.67	263	128.33
78	25.56	171	77.23	264	128.89
79	26.11	172	77.78	265	129.44
80	26.67	173	78.34	266	130.00
81	27.22	174	78.89		
82	27.78	175	79.45		



# TABLES.

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Another Method to Transform Fahrenheit to Centigrade,  
or vice versa, is the formula:

$$\frac{C \times 9}{5} + 32 \text{ equals Fahrenheit. —}$$

$$F - 32 \times \frac{5}{9} \text{ equals Centigrade.}$$

Comparison Between the Scales of Fahrenheit, Réamur and  
the Centigrade.

(Zero Fahrenheit corresponds with minus 17.78 Centigrade  
and minus 14.22 Réamur.)

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
100	212	80	24	75.2	19.2
99	210.2	79.2	23	73.4	18.4
98	208.4	78.4	22	71.6	17.6
97	206.6	77.6	21	69.8	16.8
96	204.8	76.8	20	68	16
95	203	76	19	66.2	15.2
94	201.2	75.2	18	64.4	14.4
93	199.4	74.4	17	62.6	13.6
92	197.6	73.6	16	60.8	12.8
91	195.8	72.8	15	59	12
90	194	72	14	57.2	11.2
89	192.2	71.2	13	55.4	10.4
88	190.4	70.4	12	53.6	9.6
87	188.6	69.6	11	51.8	8.8
86	186.8	68.8	10	50	8
85	185	68	9	48.2	7.2
84	183.2	67.2	8	46.4	6.4
83	181.4	66.4	7	44.6	5.6
82	179.6	65.6	6	42.8	4.8
81	177.8	64.8	5	41	4
80	176	64	4	39.2	3.2
79	174.2	63.2	3	37.4	2.4
78	172.4	62.4	2	35.6	1.6
77	170.6	61.6	1	33.8	0.8
76	168.8	60.8	Zero	32	Zero
75	167	60	1	30.2	0.8
74	165.2	59.2	2	28.4	1.6
73	163.4	58.4	3	26.6	2.4
72	161.6	57.6	4	24.8	3.2

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Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
71	159.8	56.8	4	24.8	3.2
70	158	56	5	23	4
69	156.2	55.2	6	21.2	4.8
68	154.4	54.4	7	19.4	5.6
67	152.6	53.6	8	17.6	6.4
66	150.8	52.8	9	15.8	7.2
65	149	52	9	15.8	7.2
64	147.2	51.1	10	14	8
63	145.4	50.4	11	12.2	8.8
62	143.6	49.6	12	10.4	9.6
61	141.8	48.8	13	8.6	10.4
60	140	48	14	6.8	11.2
59	138.2	47.2	15	5	12
58	136.4	46.4	16	3.2	12.8
57	134.6	45.6	17	1.4	13.6
56	132.8	44.8	18	—	14.4
55	131	44	19	2.2	15.2
54	129.2	43.2	20	4	16
53	127.4	42.4	21	5.8	16.8
52	125.6	41.6	22	7.6	17.6
51	123.8	40.8	23	9.4	18.4
50	122	40	24	11.2	19.2
49	120.2	39.2	25	13	20
48	118.4	38.4	26	14.8	20.8
47	116.6	37.6	27	16.6	21.6
46	114.8	36.8	28	18.4	22.4
45	113	36	29	20.2	23.2
44	111.2	35.2	30	22	24
43	109.4	34.4	31	23.8	24.8
42	107.6	33.6	32	25.6	25.6
41	105.8	32.8	33	27.4	26.4
40	104	32	34	29.2	27.2
39	102.2	31.2	35	31	28
38	100.4	30.4	36	32.8	28.8
37	98.6	29.6	37	34.6	29.6
36	96.8	28.8	38	36.4	30.4
35	95	28	39	38.2	31.2
34	93.2	27.2	40	40	32
33	91.4	26.4	41	41.8	32.8
32	89.6	25.6	42	43.6	33.6
31	87.8	24.8	43	45.4	34.4
30	86	24	44	47.2	35.2
29	84.2	23.2	45	49	36
28	82.4	22.4	46	50.8	36.8
27	80.6	21.6	47	52.6	37.6
26	78.8	20.8	48	54.4	38.4
25	77	20	49	56.2	39.2

## SULPHURIC ACID.

The Manufacturing Chemists' Association have adopted the following figures as representing the per cent. of  $H_2SO_4$  in an oil of vitriol. Since colorists rarely or never need to look up an acid below 80 per cent. oil of vitriol, the table only goes to that degree.

Beaumé.	Sp. Gr.	$H_2SO_4$ .	Oil Vitriol.
66	1.835	93.50	100
65	1.814	88.82	95
64	1.793	86.30	92
63	1.775	84.50	89
62	1.767	83.21	87
61	1.727	79.47	85
60	1.705	77.60	83
59	1.683	75.73	81

SPECIFIC GRAVITY OF ACETIC ACID SOLUTIONS  
15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0007	1	1.0623	51
1.0022	2	1.0631	52
1.0037	3	1.0638	53
1.0052	4	1.0646	54
1.0067	5	1.0653	55
1.0083	6	1.0660	56
1.0098	7	1.0666	57
1.0113	8	1.0673	58
1.0127	9	1.0679	59
1.0142	10	1.0685	60
1.0157	11	1.0691	61
1.0171	12	1.0697	62
1.0185	13	1.0702	63
1.0200	14	1.0707	64
1.0214	15	1.0712	65
1.0228	16	1.0717	66
1.0242	17	1.0721	67
1.0256	18	1.0725	68
1.0270	19	1.0729	69

# 12 YEAR-BOOK FOR COLORISTS AND DYERS.

## SPECIFIC GRAVITY OF ACETIC ACID SOLUTIONS 15° C.—Continued.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0284	20	1.0733	70
1.0298	21	1.0737	71
1.0311	22	1.0740	72
1.0324	23	1.0742	73
1.0337	24	1.0744	74
1.0350	25	1.0746	75
1.0363	26	1.0747	76
1.0375	27	1.0748	77
1.0388	28	1.0748	78
1.0400	29	1.0748	79
1.0412	30	1.0748	80
1.0424	31	1.0747	81
1.0436	32	1.0746	82
1.0447	33	1.0744	83
1.0459	34	1.0742	84
1.0470	35	1.0739	85
1.0481	36	1.0736	86
1.0492	37	1.0731	87
1.0502	38	1.0726	88
1.0513	39	1.0720	89
1.0523	40	1.0713	90
1.0533	41	1.0705	91
1.0543	42	1.0696	92
1.0552	43	1.0686	93
1.0562	44	1.0674	94
1.0571	45	1.0660	95
1.0580	46	1.0644	96
1.0589	47	1.0625	97
1.0598	48	1.0604	98
1.0607	49	1.0580	99
1.0615	50	1.0553	100

NOTE. The specific gravity 1.0553 may indicate either of two solutions of different strengths. To determine whether an acid is stronger than 78 per cent., (the maximum specific gravity) some water is added; if the specific gravity rises it is stronger if it falls it is weaker than 78 per cent. acid.

**SPECIFIC GRAVITY OF HYDROCHLORIC ACID  
SOLUTIONS.**

<b>Specific gravity.</b>	<b>Degrees Beaumé.</b>	<b>Percentage HCl.</b>
1.005	0.7	1.15
1.010	1.4	2.14
1.015	2.1	3.12
1.020	2.7	4.13
1.025	3.4	5.15
1.030	4.1	6.15
1.035	4.7	7.15
1.040	5.4	8.16
1.045	6.0	9.16
1.050	6.7	10.17
1.055	7.4	11.18
1.060	8.0	12.19
1.065	8.7	13.19
1.070	9.4	14.17
1.075	10.0	15.16
1.080	10.6	16.15
1.085	11.2	17.13
1.090	11.9	18.11
1.095	12.4	19.06
1.100	13.0	20.01
1.105	13.6	20.97
1.110	14.2	21.92
1.115	14.9	22.86
1.120	15.4	23.82
1.125	16.0	24.78
1.130	16.5	25.75
1.135	17.1	26.70
1.140	17.7	27.66
1.1425	18.0	28.14
1.145	18.3	28.61
1.150	18.8	29.57
1.152	19.0	29.95
1.155	19.3	30.55
1.160	19.8	31.52
1.163	20.0	32.10
1.165	20.3	32.49
1.170	20.9	33.46
1.171	21.0	33.65
1.175	21.4	34.42
1.180	22.0	35.39
1.185	22.5	36.31
1.190	23.0	37.23
1.195	23.5	38.16
1.200	24.0	39.11

**FORMALDEHYDE—SPECIFIC GRAVITY OF SOLUTIONS.**

Specific Gravity at 15.6°C.	Percentage by Weight.	Percentage by Volume.
1.0025	1.0	1.0
1.0125	5.0	5.0
1.0250	10.0	10.25
1.0380	15.0	15.6
1.0530	20.0	21.1
1.0670	25.0	26.7
1.0830	30.0	32.5
1.1040	35.0	38.6
1.1250	40.0	45.0

This table is by W. A. Davis, in the Journal of Society of Chemical Industry, 1897, 502.

**BLEACHING POWDER (CALCIUM HYPOCHLORITE)**  
**SOLUTIONS, STRENGTH AND SPECIFIC**  
**GRAVITY AT 15° C.**

Specific Gravity	Degrees Bé.	Percentage Available Cl.
1.008	1	0.5
1.015	2	1.0
1.023	3	1.5
1.030	4	2.0
1.037	5	2.5
1.045	6	3.0
1.053	7	3.5
1.060	8	4.0
1.069	9.2	4.5
1.078	10.4	5.0
1.087	11.5	5.5
1.097	12.6	6.0
1.105	13.6	6.4

## CALCIUM ACETATE SOLUTIONS.

## SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Percentage $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ .
1.0260	3.4	5
1.0530	7.1	10
1.0792	10.5	15
1.1051	13.6	20
1.1321	16.8	25
1.1594	19.8	30

## NITRIC ACID—SPECIFIC GRAVITY AND STRENGTH OF SOLUTIONS AT 0° C.

Specific Gravity.	Degrees Bé.	Per cent. $\text{HNO}_3$ .	Per cent. $\text{N}_2\text{O}_5$ .
1.007	1	1.1	0.9
1.014	2	2.2	1.9
1.022	3	3.4	2.9
1.029	4	4.5	3.9
1.036	5	5.5	4.7
1.044	6	6.7	5.7
1.052	7	8.0	6.9
1.060	8	9.2	7.9
1.067	9	10.2	8.7
1.075	10	11.4	9.8
1.083	11	12.6	10.8
1.091	12	13.8	11.8
1.100	13	15.2	13.0
1.108	14	16.4	14.0
1.116	15	17.6	15.1
1.125	16	18.9	16.2
1.134	17	20.2	17.3
1.143	18	21.6	18.5
1.152	19	22.9	19.6
1.161	20	24.2	20.7
1.171	21	25.7	22.0
1.180	22	27.0	23.1

NITRIC ACID--SPECIFIC GRAVITY AND STRENGTH OF  
SOLUTIONS AT 0°.—Continued.

Specific Gravity.	Degrees Bé.	Per cent. HNO <sub>3</sub> .	Per cent. N <sub>2</sub> O <sub>5</sub> .
1.190	23	28.5	24.4
1.199	24	29.8	25.5
1.210	25	31.4	26.9
1.221	26	33.1	28.4
1.231	27	34.6	29.7
1.242	28	36.2	31.0
1.252	29	37.7	32.3
1.261	30	39.1	33.5
1.275	31	41.1	35.2
1.286	32	42.6	36.5
1.298	33	44.4	38.0
1.309	34	46.1	39.5
1.321	35	48.0	41.1
1.334	36	50.0	42.9
1.346	37	51.9	44.5
1.359	38	54.0	46.3
1.372	39	56.2	48.2
1.384	40	58.4	50.0
1.398	41	60.8	52.1
1.412	42	63.2	54.2
1.426	43	66.2	56.7
1.440	44	69.0	59.1
1.454	45	72.2	61.9
1.470	46	76.1	65.2
1.485	47	80.2	68.7
1.501	48	84.5	72.4
1.516	49	88.4	75.8
1.524	49.5	90.5	77.6
1.532	50	92.7	79.5
1.541	50.5	95.0	81.4
1.549	51	97.3	83.4
1.559	51.5	100.0	85.7



ALUMINIUM ACETATE SOLUTIONS—  
STRENGTH AND SPECIFIC GRAVITY AT 17° C.

Specific gravity.	Degrees Bé.	Percentage $\text{Al}_2\text{O}_3$ .
1.012	1.6	0.5
1.025	3.4	1.0
1.038	5.0	1.5
1.050	6.7	2.0
1.062	8.3	2.5
1.074	9.9	3.0
1.086	11.3	3.5
1.098	12.8	4.0
1.100	13.0	4.5

ALUMINIUM NITRO-ACETATE SOLUTIONS—  
SPECIFIC GRAVITY AND STRENGTH AT 17° C.

Specific gravity.	Degrees Bé.	Percentage $\text{Al}_2\text{O}_3$ .
1.012	1.6	0.5
1.025	3.4	1.0
1.039	5.3	1.5
1.054	7.2	2.0
1.068	9.1	2.5
1.083	11.0	3.0
1.097	12.7	3.5
1.112	14.4	4.0
1.126	16.1	4.5
1.141	17.8	5.0
1.156	19.4	5.5
1.160	19.8	5.64

(2)

ALUMINIUM SULPHATE SOLUTIONS—  
STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage $\text{Al}_2(\text{SO}_4)_3$ .	Specific gravity.	Percentage $\text{Al}_2(\text{SO}_4)_3$ .
1.0170	1	1.1467	14
1.0270	2	1.1574	15
1.0370	3	1.1688	16
1.0470	4	1.1770	17
1.0569	5	1.1876	18
1.0670	6	1.1971	19
1.0768	7	1.2074	20
1.0870	8	1.2168	21
1.0968	9	1.2274	22
1.1071	10	1.2375	23
1.1171	11	1.2473	24
1.1270	12	1.2573	25
1.1369	13		

ALUMINIUM CHLORIDE SOLUTIONS.  
STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Percentage $\text{Al}_2\text{Cl}_6$ .	Specific Gravity.	Percentage $\text{Al}_2\text{Cl}_6$ .
1.00721	1	1.17092	22
1.01443	2	1.17953	23
1.02164	3	1.18815	24
1.02885	4	1.19676	25
1.03603	5	1.20584	26
1.04353	6	1.21493	27
1.05099	7	1.22406	28
1.05845	8	1.23310	29
1.06591	9	1.24219	30
1.07337	10	1.25184	31
1.08120	11	1.26149	32

## TABLES.

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Specific Gravity	Percentage	Specific Gravity	Percentage
1.08902	12	1.27115	33
1.09684	13	1.28080	34
1.10466	14	1.29046	35
1.11248	15	1.30066	36
1.12073	16	1.31086	37
1.12897	17	1.32106	38
1.13721	18	1.33126	39
1.14545	19	1.34146	40
1.15370	20	1.35224	41
1.16231	21	1.35359	41.126

## SODA SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Degree Bé.	Percentage by weight	
		Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> CO <sub>3</sub> +10H <sub>2</sub> O
1.007	1	0.67	1.807
1.014	2	1.33	3.587
1.022	3	2.09	5.637
1.029	4	2.76	7.444
1.036	5	3.43	9.251
1.045	6	4.29	11.570
1.052	7	4.94	13.323
1.060	8	5.71	15.400
1.067	9	6.37	17.180
1.075	10	7.12	19.203
1.083	11	7.88	21.252
1.091	12	8.62	23.248
1.100	13	9.43	25.432
1.108	14	10.19	27.482
1.116	15	10.95	29.532
1.125	16	11.81	31.851
1.134	17	12.61	34.009
1.142	18	13.16	35.493
1.152	19	14.24	38.405

## GLAUBER SALT SOLUTIONS—

## SPECIFIC GRAVITY AT 19° C.

Specific gravity.	Percentage	
	$\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$	$\text{Na}_2\text{SO}_4$
1.0040	1	0.441
1.0079	2	0.881
1.0118	3	1.323
1.0158	4	1.764
1.0198	5	2.205
1.0238	6	2.646
1.0278	7	3.087
1.0318	8	3.528
1.0358	9	3.969
1.0398	10	4.410
1.0439	11	4.851
1.0479	12	5.292
1.0520	13	5.733
1.0560	14	6.174
1.0601	15	6.615
1.0642	16	7.056
1.0683	17	7.497
1.0725	18	7.938
1.0766	19	8.379
1.0807	20	8.820
1.0849	21	9.261
1.0890	22	9.702
1.0931	23	10.143
1.0973	24	10.584
1.1015	25	11.025
1.1057	26	11.466
1.1100	27	11.907
1.1142	28	12.348
1.1184	29	12.789
1.1226	30	13.230

COMMON SALT SOLUTIONS—  
SPECIAL GRAVITY AT 15° C.

Specific gravity.	Per cent. NaCl.	Specific gravity.	Per cent. NaCl.
1.00725	1	1.10384	14
1.01450	2	1.11146	15
1.02174	3	1.11938	16
1.02899	4	1.12730	17
1.03624	5	1.13523	18
1.04366	6	1.14315	19
1.05108	7	1.15107	20
1.05851	8	1.15931	21
1.06593	9	1.16755	22
1.07335	10	1.17580	23
1.08097	11	1.18404	24
1.08859	12	1.19228	25
1.09622	13	1.20098	26

SODIUM BISULPHITE SOLUTIONS.  
SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Degrees Bé.	Percentage. NaHSO <sub>3</sub> .	SO <sub>2</sub> .
1.008	1	1.6	0.4
1.022	3	2.1	1.3
1.038	5	3.6	2.2
1.052	7	5.1	3.1
1.068	9	6.5	3.9
1.084	11	8.0	4.8
1.100	13	9.5	5.7
1.116	15	11.2	6.8
1.134	17	12.8	7.8
1.152	19	14.6	9.0
1.171	21	16.5	10.2
1.190	23	18.5	11.5
1.210	25	20.9	12.9
1.230	27	23.5	14.5
1.252	29	25.9	15.9
1.275	31	28.9	17.8
1.298	33	31.7	19.6
1.321	35	34.7	22.5
1.345	37	38.0	23.6

## SODIUM ACETATE SOLUTIONS.

## SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	percentage.	
	$\text{NaC}_2\text{H}_3\text{O}_2$	$\text{NaC}_2\text{H}_3\text{O}_2 + 3\text{H}_2\text{O}$
1.0150	3.015	5
1.0310	6.030	10
1.0470	9.045	15
1.0630	12.060	20
1.0795	15.075	25
1.0960	18.090	30
1.1130	21.105	35
1.1305	24.120	40
1.1485	27.135	45
1.1485	27.135	45
1.1670	30.150	50

## SPECIFIC GRAVITY OF SULPHUROUS ACID 15° C.

Specific gravity.	Percentage $\text{SO}_2$ .	Specific gravity.	Percentage $\text{SO}_2$ .
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

TARTARIC ACID SOLUTIONS—  
SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0045	1	1.1505	30
1.0090	2	1.1615	32
1.0179	4	1.1726	34
1.0273	6	1.1840	36
1.0371	8	1.1959	38
1.0469	10	1.2078	40
1.0565	12	1.2198	42
1.0661	14	1.2317	44
1.0761	16	1.2441	46
1.0865	18	1.2568	48
1.0969	20	1.2696	50
1.1072	22	1.2828	52
1.1175	24	1.2961	54
1.1282	26	1.3093	56
1.1393	28	1.3220	57.9

Saturated.

## STANNIC CHLORIDE SOLUTIONS—

## STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage $\text{SnCl}_4 + 5\text{H}_2\text{O}$ .	Specific gravity.	Percentage $\text{SnCl}_4 + 5\text{H}_2\text{O}$ .
1.012	2	1.366	50
1.024	4	1.386	52
1.036	6	1.406	54
1.048	8	1.426	56
1.059	10	1.447	58
1.072	12	1.468	60
1.084	14	1.491	62
1.097	16	1.514	64
1.110	18	1.538	66
1.124	20	1.563	68
1.137	22	1.587	70
1.151	24	1.614	72
1.165	26	1.641	74
1.180	28	1.669	76
1.195	30	1.698	78
1.210	32	1.727	80
1.227	34	1.759	82
1.242	36	1.791	84
1.259	38	1.824	86
1.276	40	1.859	88
1.293	42	1.893	90
1.310	44	1.932	92
1.329	46	1.969	94
1.347	48	1.988	96



TIN CRYSTALS (STANNOUS CHLORIDE) SOLUTION OF  
STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Percentage Sn $\text{Cl}_2 + 2\text{H}_2\text{O}$ .	Specific Gravity.	Percentage Sn $\text{Cl}_2 + 2\text{H}_2\text{O}$ .
1.013	2	1.330	40
1.026	4	1.352	42
1.040	6	1.374	44
1.054	8	1.397	46
1.068	10	1.421	48
1.083	12	1.445	50
1.097	14	1.471	52
1.113	16	1.497	54
1.128	18	1.525	56
1.144	20	1.554	58
1.161	22	1.582	60
1.177	24	1.613	62
1.194	26	1.644	64
1.212	28	1.677	66
1.230	30	1.711	68
1.249	32	1.745	70
1.268	34	1.783	72
1.288	36	1.821	74
1.309	38	1.840	75

TARTAR EMETIC SOLUTIONS—  
STRENGTH AND SPECIFIC GRAVITY AT 17.5° C.

Specific gravity.	Percentage $\text{SbOKC}_2\text{H}_3\text{O}_6$ $+ \frac{1}{2}\text{H}_2\text{O}$ .	Specific gravity.	Percentage $\text{SbOKC}_2\text{H}_3\text{O}_6$ $+ \frac{1}{2}\text{H}_2\text{O}$ .
1.005	0.5	1.022	3.5
1.007	1.0	1.027	4.0
1.009	1.5	1.031	4.5
1.012	2.0	1.035	5.0
1.015	2.5	1.038	5.5
1.018	3.0	1.044	6.0

## TANNIN SOLUTIONS—

## SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0040	1.0	1.0140	3.5
1.0044	1.1	1.0144	3.6
1.0048	1.2	1.0148	3.7
1.0052	1.3	1.0152	3.8
1.0056	1.4	1.0156	3.9
1.0060	1.5	1.0160	4.0
1.0064	1.6	1.0164	4.1
1.0068	1.7	1.0168	4.2
1.0072	1.8	1.0172	4.3
1.0076	1.9	1.0176	4.4
1.0080	2.0	1.0180	4.5
1.0084	2.1	1.0184	4.6
1.0088	2.2	1.0188	4.7
1.0092	2.3	1.0192	4.8
1.0096	2.4	1.0196	4.9
1.0100	2.5	1.0200	5.0
1.0104	2.6	1.0242	6.0
1.0108	2.7	1.0242	6.0
1.0112	2.8	1.0324	8.0
1.0116	2.9	1.0406	10.0
1.0120	3.0	1.0489	12.0
1.0124	3.1	1.0572	14.0
1.0128	3.2	1.0656	16.0
1.0132	3.3	1.0740	18.0
1.0136	3.4	1.0824	20.0

## TABLES.

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## AREOMETRY OR HYDROMETRY.

COMPARISON BETWEEN THE SPECIFIC GRAVITY OF BEAUME AND  
TWADDLE.

Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.
0	0	1.000	44	26.0	1.220	88	44.1	1.440	132	57.4	1.660
1	0.7	1.005	45	26.4	1.225	89	44.4	1.445	133	57.7	1.665
2	1.4	1.010	46	26.9	1.230	90	44.8	1.450	134	57.9	1.670
3	2.1	1.015	47	27.4	1.235	91	45.1	1.455	135	58.2	1.675
4	2.7	1.020	48	27.9	1.240	92	45.4	1.460	136	58.4	1.680
5	3.4	1.025	49	28.4	1.245	93	45.8	1.465	137	58.7	1.685
6	4.1	1.030	50	28.8	1.250	94	46.1	1.470	138	58.9	1.690
7	4.7	1.035	51	29.3	1.255	95	46.4	1.475	139	59.2	1.695
8	5.4	1.040	52	29.7	1.260	96	46.8	1.480	140	59.5	1.700
9	6.0	1.045	53	30.2	1.265	97	47.1	1.485	141	59.7	1.705
10	6.7	1.050	54	30.6	1.270	98	47.4	1.490	142	60.0	1.710
11	7.4	1.055	55	31.1	1.275	99	47.8	1.495	143	60.2	1.715
12	8.0	1.060	56	31.5	1.280	100	48.1	1.500	144	60.4	1.720
13	8.7	1.065	57	32.0	1.285	101	48.4	1.505	145	60.6	1.725
14	9.4	1.070	58	32.4	1.290	102	48.7	1.510	146	60.9	1.730
15	10.0	1.075	59	32.8	1.295	103	49.0	1.515	147	61.1	1.735
16	10.6	1.080	60	33.3	1.300	104	49.4	1.520	148	61.4	1.740
17	11.2	1.085	61	33.7	1.305	105	49.7	1.525	149	61.6	1.745
18	11.9	1.090	62	34.2	1.310	106	50.0	1.530	150	61.8	1.750
19	12.4	1.095	63	34.6	1.315	107	50.3	1.535	151	62.1	1.755
20	13.0	1.100	64	35.0	1.320	108	50.6	1.540	152	62.3	1.760
21	13.6	1.105	65	35.4	1.325	109	50.9	1.545	153	62.5	1.765
22	14.2	1.110	66	35.8	1.330	110	51.2	1.550	154	62.8	1.770
23	14.9	1.115	67	36.2	1.335	111	51.5	1.555	155	63.0	1.775
24	15.4	1.120	68	36.6	1.340	112	51.8	1.560	156	63.2	1.780
25	16.0	1.125	69	37.0	1.345	113	52.1	1.565	157	63.5	1.785
26	16.5	1.130	70	37.4	1.350	114	52.4	1.570	158	63.7	1.790
27	17.1	1.135	71	37.8	1.355	115	52.7	1.575	159	64.0	1.795
28	17.7	1.140	72	38.2	1.360	116	53.0	1.580	160	64.2	1.800
29	18.3	1.145	73	38.6	1.365	117	53.3	1.585	161	64.4	1.805
30	18.8	1.150	74	39.0	1.370	118	53.6	1.590	162	64.6	1.810
31	19.3	1.155	75	39.4	1.375	119	53.9	1.595	163	64.8	1.815
32	19.8	1.160	76	39.8	1.380	120	54.1	1.600	164	65.0	1.820
33	20.3	1.165	77	40.1	1.385	121	54.4	1.605	165	65.2	1.825
34	20.9	1.170	78	40.5	1.390	122	54.7	1.610	166	65.5	1.830
35	21.4	1.175	79	40.8	1.395	123	55.0	1.615	167	65.7	1.835
36	22.0	1.180	80	41.2	1.400	124	55.2	1.620	168	65.9	1.840
37	22.5	1.185	81	41.6	1.405	125	55.5	1.625	169	66.1	1.845
38	23.0	1.190	82	42.0	1.410	126	55.8	1.630	170	66.3	1.850
39	23.5	1.195	83	42.3	1.415	127	56.0	1.635	171	66.5	1.855
40	24.0	1.200	84	42.7	1.420	128	56.3	1.640	172	66.7	1.860
41	24.5	1.205	85	43.1	1.425	129	56.6	1.645	173	67.0	1.865
42	25.0	1.210	86	43.4	1.430	130	56.9	1.650			
43	25.5	1.215	87	43.8	1.435	131	57.1	1.655			

If the sample is too viscous to determine the density directly, a weighed portion of it can be first diluted with a weighed quantity of water, or a weighed portion can be dissolved and diluted to a known volume with water. In the first instance the per cent. of total solids is to be calculated by the following formula:

$$\text{Per cent. of solids in the undiluted material} = \frac{WS}{W}$$

S = per cent. of solids in the diluted material.

W = weight of the diluted material.

w = weight of the sample taken for dilution.

If the dilution was made to a definite volume, the following formula is to be used:

$$\text{Per cent. of solids in the undiluted material} = \frac{VDS}{W}$$

V = volume of the diluted solution.

D = specific gravity of the diluted solution.

S = per cent. of solids in the diluted solution.

w = weight of the sample taken for dilution.

To reduce a liquid to a desired specific gravity:

Let v equal the volume of the first liquid.

Let B " " Beaumé of the first liquid.

Let b " " Beaumé of the second or reducing liquid.

Let a " " Beaumé required.

Let z " " volume of the reducing liquid.

$$z = \frac{av - vB}{b - a}$$

## TO CHANGE FROM TWADDLE TO SPECIFIC GRAVITY,

OR

## TO CHANGE FROM SPECIFIC GRAVITY TO TWADDLE.

In order to change degrees Twaddle into specific gravity, multiply by 5, add 1,000, and divide by 1,000. Example: Change 168° Twaddle into specific gravity.

$$\begin{array}{r}
 168 \times 5 \\
 \hline
 840 \\
 1,000 \\
 \hline
 1,000 \overline{) 1,840}
 \end{array}$$

1.84 Spec. Grav.

To change specific gravity into degrees Twaddle, multiply by 1,000, subtract 1,000, and divide by 5. Example: Change 1.84 specific gravity into degrees Twaddle.

$$\begin{array}{r}
 1.84 \times 1,000 \\
 \hline
 1,840 \\
 1,000 \\
 \hline
 5 \overline{) 840}
 \end{array}$$

168° Tw.

The degrees of Twaddle's hydrometer are easily turned into specific gravity numbers—a quality which makes it preferable to any other hydrometer in use. The rule is to multiply the indicated degree by 5, and add 1,000 to the product; for example, 9 degrees Twaddle equals specific gravity 1,045; 25 degrees Twaddle equals specific gravity 1,125; 100 degrees Twaddle equals specific gravity 1,500; and so on. To bring specific gravity numbers to degrees of Twaddle, subtract 1,000, and divide the remainder by 5; for example: specific gravity 1,000 equals 20 degrees Twaddle.

## WATER ANALYSIS.

Analysis of water are sometimes reported as parts per million, and sometimes grains per imperial gallon, and sometimes grains per United States gallon. The following table gives all three values:

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
1	0.0700	0.0583	51	3.5700	2.9742
2	0.1400	0.1166	52	3.6400	3.0325
3	0.2100	0.1749	53	3.7100	3.0908
4	0.2800	0.2332	54	3.7800	3.1491
5	0.3500	0.2915	55	3.8500	3.2074
6	0.4200	0.3499	56	3.9200	3.2658
7	0.4900	0.4082	57	3.9900	3.3241
8	0.5600	0.4665	58	4.0600	3.3824
9	0.6300	0.5248	59	4.1300	3.4407
10	0.7000	0.5831	60	4.2000	3.4990
11	0.7700	0.6414	61	4.2700	3.5573
12	0.8400	0.6998	62	4.3400	3.6157
13	0.9100	0.7581	63	4.4100	3.6740
14	0.9800	0.8165	64	4.4800	3.7323
15	1.0500	0.8747	65	4.5500	3.7909
16	1.1200	0.9330	66	4.6200	3.8485
17	1.1900	0.9914	67	4.6900	3.9073
18	1.2600	1.0497	68	4.7600	3.9656
19	1.3300	1.1080	69	4.8300	4.0239
20	1.4000	1.1663	70	4.9000	4.0822
21	1.4700	1.2246	71	4.9700	4.1405
22	1.5400	1.2829	72	5.0400	4.1988
23	1.6100	1.3413	73	5.1100	4.2575
24	1.6800	1.3996	74	5.1800	4.3155
25	1.7500	1.4579	75	5.2500	4.3738
26	1.8200	1.5162	76	5.3200	4.4321
27	1.8900	1.5745	77	5.3900	4.4904
28	1.9600	1.6329	78	5.4600	4.5488
29	2.0300	1.6912	79	5.5300	4.6071
30	2.1000	1.7495	80	5.6000	4.6654
31	2.1700	1.8078	81	5.6700	4.7237
32	2.2400	1.8661	82	5.7400	4.7820
33	2.3100	1.9244	83	5.8100	4.8403
34	2.3800	1.9828	84	5.8800	4.8987
35	2.4500	2.0411	85	5.9500	4.9570
36	2.5200	2.0994	86	6.0200	5.0154
37	2.5900	2.1577	87	6.0900	5.0738

TABLES.

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38	2.6600	2.2160	88	6.1600	5.1319
39	2.7300	2.2745	89	6.2300	5.1903
40	2.800	2.3327	90	6.3000	5.2486
41	2.8700	2.3910	91	6.3700	5.3069
42	2.9400	2.4493	92	6.4400	5.3652
43	3.0100	2.5076	93	6.5100	5.4235
44	3.0800	2.5659	94	6.5800	5.4818
45	3.1500	2.6243	95	6.6500	5.5402
46	3.2200	2.6826	96	6.7200	5.5985
47	3.2900	2.7409	97	6.7900	5.6568
48	3.3600	2.7992	98	6.8600	5.7151
49	3.4300	2.8575	99	6.9300	5.7734
50	3.5000	2.9129	100	7.0000	5.8318

## SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.

NAME.	SYMBOL.	ATOMIC WEIGHT.			
H = 1. O = 16. Richards. German.					
Aluminium	.....Al....	26.9	27.1	27.1	27.1
Antimony	.....Sb....	119.5	120.4	120.0	120.
Argon	.....A....	39.6	39.9	39.97	40.
Arsenic	.....As....	74.45	75.0	75.0	75.
Barium	.....Ba....	136.4	137.40	137.43	137.4
Bismuth	.....Bi....	206.9	208.5	208.0	208.5
Boron	.....B....	10.9	11.0	10.95	11.
Bromine	.....Br....	79.34	79.95	79.955	79.96
Cadmium	.....Cd....	111.55	112.4	112.3	112.
Caesium	.....Cs....	131.9	132.9	132.9	133.
Calcium	.....Ca....	39.8	40.1	40.1	40.
Carbon	.....C....	11.9	12.0	12.001	12.00
Cerium	.....Ce....	138.0	139.0	140.	140.
Chlorine	.....Cl....	35.18	35.45	35.455	35.45
Chromium	.....Cr....	51.7	52.1	52.14	52.1
Cobalt	.....Co....	58.55	59.00	59.00	59.
Columbium	.....Cb....	93.0	93.7	94.	94.
(Niobium)					
Copper	.....Cu....	63.1	63.6	63.60	63.6
Erbium	.....Er....	164.7	166.0	166.	166.
Fluorine	.....F....	18.9	19.05	19.05	19.
Gadolinium	.....Gd....	155.8	157.0	156.	...
Gallium	.....Ga....	69.5	70.0	70.0	70.
Germanium	.....Ge....	71.9	72.5	72.5	72.
Glucinum	.....Gl....	9.0	9.1	9.1	9.1
(Beryllium)					
Gold	.....Au....	195.7	197.2	197.3	197.2
Helium	.....He....	4.	4.	4.07	4.
Hydrogen	.....H....	1.000	1.008	1.0075	1.01
Indium	.....In....	113.1	114.0	114.	114.
Iodine	.....I....	125.89	126.85	126.85	126.85



## TABLES.

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NAME.	SYMBOL.	ATOMIC WEIGHT.			
		H = 1.	O = 16.	Richards.	German.
Iridium	.....Ir....	191.7	193.1	193.0	193.
Iron	.....Fe....	55.46	55.88	56.0	56.
Krypton	.....Kr....	81.2	81.8	...	81.8
Lanthanum	.....La....	137.6	138.6	138.5	138.
Lead	.....Pb....	205.36	206.92	206.92	206.9
Lithium	.....Li....	6.97	7.03	7.03	7.03
Magnesium	.....Mg....	24.1	24.3	24.36	24.36
Manganese	.....Mn....	54.6	55.0	55.02	55.
Mercury	.....Hg....	198.50	200.0	200.0	200.3
Molybdenum	.....Mo....	95.3	96.0	96.0	96.
Neodymium	.....Nd....	142.5	143.6	143.6	144.
Neon	.....Ne....	19.9	20.	...	20.
Nickel	.....Ni....	58.25	58.70	58.70	58.7
Nitrogen	.....N....	13.93	14.04	14.045	14.04
Osmium	.....Os....	189.6	191.0	190.8	191.
Oxygen	.....O....	15.88	16.000	16.0000	16.00
Palladium	.....Pd....	106.2	107.0	106.5	106.
Phosphorus	.....P....	30.75	31.0	31.0	31.
Platinum	.....Pt....	193.4	194.9	195.2	194.8
Potassium	.....K....	38.82	39.11	39.140	39.15
Praseodymium	...Pr....	139.4	140.5	140.5	140.
Radium	.....	228.3	225.	...	...
Rhodium	.....Rh....	102.2	103.0	103.0	103.
Rubidium	.....Rb....	84.75	85.4	85.44	85.4
Ruthenium	.....Ru....	100.9	101.7	101.7	101.7
Samarium	.....Sa....	149.2	150.3	150.0	150.
Scandium	.....Sc....	43.8	44.1	44.	44.1
Selenium	.....Se....	78.6	79.2	79.2	79.1
Silicon	.....Si....	28.2	28.4	28.4	28.4
Silver	.....Ag....	107.11	107.92	107.930	107.93
Sodium	.....Na....	22.88	23.05	23.050	23.05
Strontium	.....St....	86.95	87.60	87.68	87.6

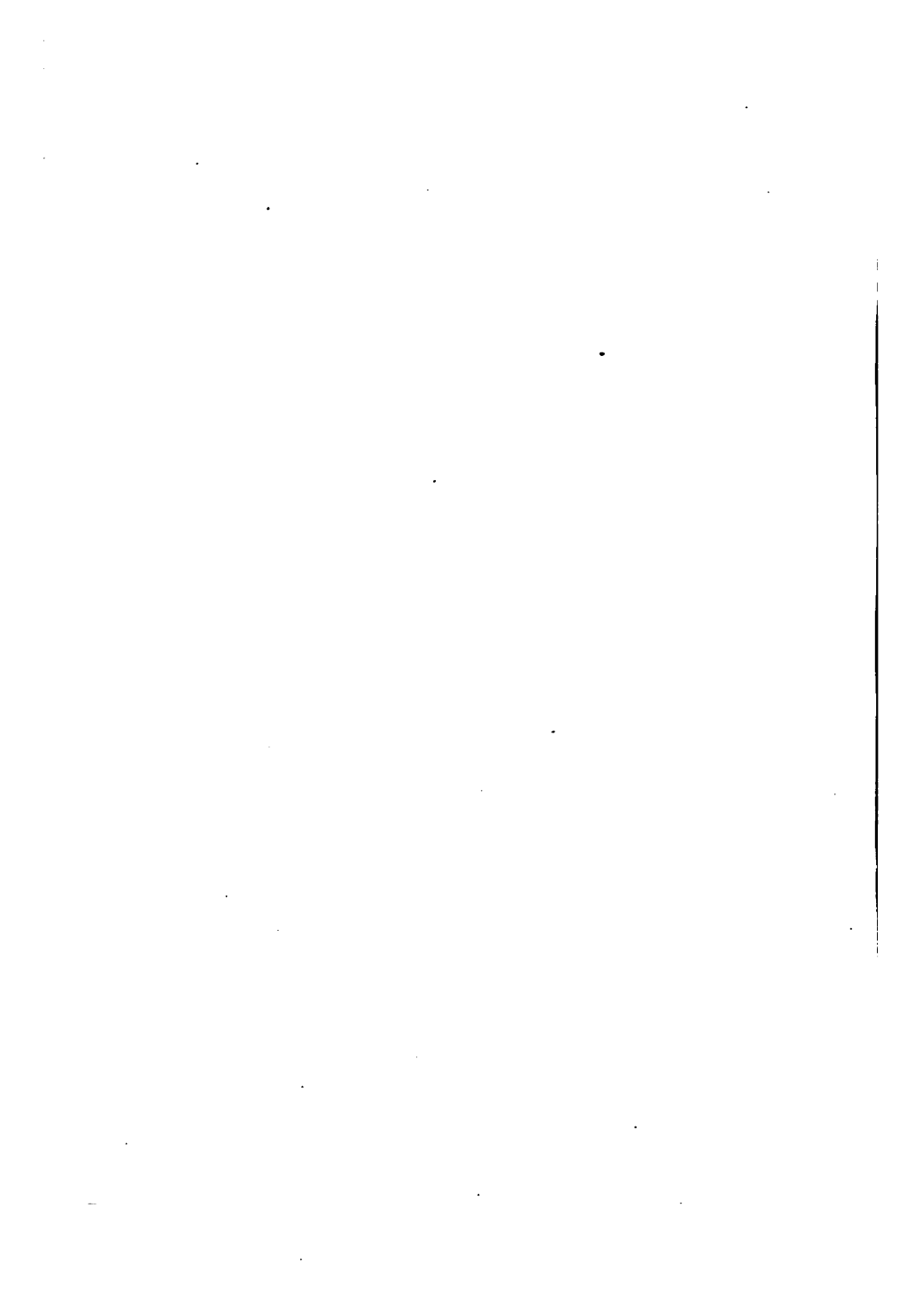
(3)

NAME.	SYMBOL.	ATOMIC WEIGHT.			
H = 1. O = 16. Richards. German.					
Sulphur .....	S....	31.83	32.07	32.065	32.06
Tantalum .....	Ta....	181.5	182.8	183.	183.
Tellurium .....	Te....	126.5	127.5 ?	127.5 ?	127.
Terbium .....	Tb....	158.8	160.	160.	...
Thallium .....	Tl....	202.61	204.15	204.15	204.1
Thorium .....	Th....	230.8	232.6	233.	232.
Thulium .....	Tm....	169.4	170.7	170. ?	...
Tin .....	Sn....	118.1	119.0	119.0	118.5
Titanium .....	Ti....	47.8	48.15	48.17	48.1
Tungsten .....	W....	182.6	184.	184.4	184.
Uranium .....	U....	237.8	239.6	240.	239.5
Vanadium .....	V....	51.0	51.4	51.4	51.2
Xenon .....	X....	127.	1.8.	...	128.
Ytterbium .....	Yb....	171.9	173.2	173.	173.
Yttrium .....	Yt....	88.3	89.0	89.0	89.
Zinc .....	Zn....	64.9	65.4	65.40	65.4
Zirconium .....	Zr....	89.7	90.4	90.5	90.6

PART II.

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CLASSIFICATION OF THE  
DYESTUFFS IN COMMON USE



## II.—CLASSIFICATION OF THE DYESTUFFS IN COMMON USE.

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The dyestuffs in ordinary use may be, for convenience of studying their properties and methods of employment, divided into the following groups:

Basic colors.

Resorcline colors.

Acid colors.

Azo colors.

Mordant colors.

Sulphur colors.

Natural coloring matters.

**BASIC COLORS.**—These are salts of the color bases of the diphenyl or triphenyl-methane, acridine, oxazine, thiazine, safranine, or induline series and certain amido azo colors. The chromophor or color forming group is contained in the base, and so they are termed basic colors. The free color base is usually colorless, and only when this base is combined with an acid is the color formed.

These colors dye cotton which is mordanted with tannin by the formation of tannic acid color lakes, and some other mordants, such as Turkey red oil, etc., have an affinity for them.

Wool is dyed in a neutral bath, or one which is very slightly acid. Mineral acids prevent any fixation on the fibre.

The basic colors are found on the market generally as hydrochloric acid salts, but acetates, oxalates, sulphates, nitrates, or zinc chloride double salts are also sold. The free bases are commercially rare, but may be precipitated from solutions of salts by the addition of alkaline carbonates or hydrates. They

are usually insoluble in water. All basic colors are soluble in alcohol.

**RESORCINE COLORS.**—These are the potassium or sodium salts of various bromine or iodine compounds of fluoresceine or chlorinated fluoresceine. The aqueous solutions are precipitated by mineral acids; and they are readily absorbed by ether from the acid solution. Their solutions are remarkably fluorescent. They dye wool and silk in a bath slightly acidified with acetic acid. Closely allied to these are the Rhodamines, which are obtained by the action of phthalic anhydride on amidophenols or their allies.

**ACID COLORS.**—These are usually the sodium or calcium salts of the sulphonic acids of the basic dyestuffs. They usually produce similar shades to the basic dyestuffs from which they are derived, but have only about one-half their tinctorial power. These consist mainly of green, blue and violet dyes, but include Acid Magenta, Azo Carmine and Chinoline Yellow. They dye wool and silk in an acid bath, and are not permanently reduced by boiling with zinc dust and hydrochloric acid.

**AZO COLORS.**—This name is applied to the large group of colors formed by various modifications of the diazo reaction discovered in 1858 by Greiss. It is divided into

Monazo dyes.

Primary disazo dyes.

Secondary disazo dyes.

Tertiary disazo dyes.

Trisazo dyes.

Tetrazo dyes.

Tetrakisazo dyes.

Monazo dyes are those containing one—N=N—group in the molecule. These commercially are found in the form of sulphonic acid salts, and are used for wool and silk dyeing.

Disazo dyes. These contain two groups— $\text{N}=\text{N}$ —.

The primary disazo dyes are formed by combining two monazo bodies to one amido or phenolic body.

Secondary disazo dyes are formed by combining a monazo body to an amido body, diazotizing the compound thus formed and combining with an amido or phenolic body.

Tertiary disazo dyes may be formed by combining one molecule of a diazotized diamido compound with two molecules of amines or phenolic bodies.

Trisazo dyes are those which contain three groups— $\text{N}=\text{N}$ —.

Tetrakisazo dyes are those which contain four groups— $\text{N}=\text{N}$ —.

Tetrazo dyes. This is the name given to the azo compounds which have the property of dyeing cotton directly without the aid of a mordant. It is based on the fact that they contain four atoms of combining nitrogen in the molecule.

With the exception of the monazo bodies these dyestuffs may be used for either animal or vegetable fibres, and in some cases are suitable for both.

**MORDANT COLORS.**—The principal characteristic of these colors is their property of forming insoluble color lakes with metallic oxides fixed on the fibre. In other respects these dyestuffs may differ greatly, some only yielding colors when applied in this way, others not giving full shades, while others may have some of their properties only altered. Some yield only one color with the various oxides, while others give a great variety.

This group of dyestuffs may be subdivided into (1) Alizarines, (2) Pyrogallol Derivatives, (3) Azo Compounds, (4) Nitroso Compounds.

Alizarine Red is an example of the first, Gallocyanine of the second, Mordant Yellow of the third, and Solid Green of the last.

These mordant dyes are used for dyeing and printing cotton, wool and silk, and have a wide use on account of their fastness to washing, soaping, fulling and light.

The principal metallic mordants used for these are those of chromium, iron, aluminum, tin, and lately some of the rarer metals have been suggested.

**SULPHUR COLORS.**—This is a new group of colors, although one member of it, Cachou de Laval, has been known for some time. These colors are obtained by treating various aromatic bodies with sodium sulphide and sulphur under various conditions, in some cases by fusion, others by boiling under pressure and others under ordinary pressure with various other modifications, as the presence of metals or metallic salts in the melt or solution. They are used only on vegetable fibres, and yield a great variety of shades, except red, of great fastness, but little brilliancy. They usually require a strongly alkaline dyebath, and generally require solution by the aid of sodium sulphide. In a number of cases the dyeings require an after treatment with metallic salts to insure perfect fastness.

**NATURAL COLORING MATTERS.**—Formerly this was the most important group in use, but it has gradually declined, and now it practically has only three members of importance, and one of these, indigo, has, it may be said, been removed to the coal tar group, leaving only logwood and fustic of any great interest to the dyer and printer. All the natural dyestuffs require special treatment to properly develop the colors, some requiring, like indigo, reduction in the vat, but the larger part require metallic mordants for their proper applications.



PART III.



PATENTS.



## PATENTS FOR THE YEAR 1903.

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- I. Dyestuffs and Coloring Matters.
- II. Process of Application.
- III. Chemical Processes.
- IV. Machines.
- V. Miscellaneous.



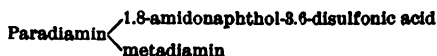
## I.—DYESTUFFS AND COLORING MATTERS.

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### PROCESS OF MAKING BLACK POLYAZO DYES.

Jens Dedichen, of Berlin, Germany, assignor to Actien Gesellschaft fur Anilin Fabrication. Patent No. 717,550, dated January 6, 1903.

The claim covers the process for the manufacture of black polyazo dyestuffs, which consist in allowing a diazo compound to react on a mixed disazo dyestuff represented by the formula:



obtained by combining in the presence of free mineral acid the terazo compound derived from a paradiamine with 1.8-amidonaphthol 3.6-disulphonic acid and combining the intermediate product thus formed in an alkaline solution with a metadiamine.

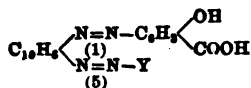
They produce on unmordanted cotton from a bath containing soap or common salt greenish-black shades of great intensity.

### MIXED DISAZO DYE AND PROCESS OF MAKING SAME.

Conrad Schraube and Walter Voigtlander-Tetzner, of Ludwigshaffen-on-the-Rhine, Germany, assignors to Badische Anilin and Soda Fabrik. Patent No. 718,028, dated January 6, 1903.

The tetrazo compound of 1.5 naphthalenediamine has prior to

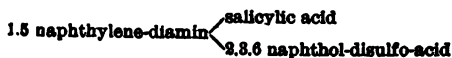
our invention only been used for the manufacture of a series of substantive azo coloring matters for cotton. The inventors have discovered that the mixed disazo dyes that can be obtained from this tetrazo compound and which contain salicylic acid as one component are excellent dyes for use in connection with metallic mordants on wool. These dyestuffs have the formula



where Y denotes an azo component other than salicylic acid. These coloring matters can best be manufactured by combining one molecular proportion of the tetrazo compound with one molecular proportion of salicylic acid in alkaline solution and subsequently combining the intermediate product thus obtained, which still contains a free disazo residue, with the final component chosen. The final component selected mainly influences the shade of the product obtained.

The coloring matters obtained in accordance with our invention can be used for dyeing chrome-mordanted wool, or they can be dyed on wool in the acid-bath and subsequently suitably treated with a chromate or a suitable chrome-oxide salt. In either case the dyeings possess a high degree of fastness against fulling.

The claim specifies the compound



## AZO DYE AND PROCESS OF MAKING SAME.

Walter Voigtlaender-Tetzner, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin and Soda Fabrik. Patent No. 718,032, dated January 6, 1903.

The claims specify the process for the production of azo coloring-matters, which consists in combining diazotized meta-amido-benzene azo salicylic acid with 1-naphthol-4-sulpho-acid in alkaline solution.

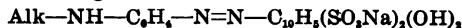
And as the product the azo coloring-matter which can be prepared from diazotized meta-amido-benzene-azo salicylic acid and 1-naphthol-4-sulpho-acid, which on suitable treatment with zinc-dust, caustic soda and hydrochloric acid yields meta-phenylene-diamine and para-amido salicylic acid, and on suitable treatment with stannous chloride and hydrochloric acid yields 2-amido-1-naphthol-4-sulpho-acid.

## BLUE WOOL-DYE AND PROCESS OF MAKING SAME.

Arthur Weinberg, of Frankfort-on-the-Main, Germany, assignor to Leopold Cassella & Co. Patent No. 718,181, dated January 13, 1903.

The inventor has found that by combining p. diazoacetyl-alkylaniline with the sulphonic acids of the 1.8 dioxynaphthalene and by subsequent saponification of the thus-produced azo bodies new wool-dyestuffs are obtained which are distinguished for their pure-blue shades and great fastness to light.

These have the general formula:



## SULPHURIZED COTTON-DYE AND PROCESS OF MAKING SAME.

Louis Haas, of Mannheim, Germany, assignor to Badische Anilin and Soda Fabrik. Patent No. 718,342, dated January 13, 1903.

This invention relates to sulphurized substantive cotton-

coloring matter, which dyes unmordanted cotton shades, which are within the range of from yellow to brown, and a process for producing the same. The new coloring-matter is formed by treating with sodium sulphid and sulphur the sodium salts of certain nitration products of benzyl sulphonic acid. Among the nitration products found to be useful for the purposes of this invention are para-mono-nitro-benzyl-sulphonic acid and dinitro-benzyl sulphonic acid.

When the above-described dinitro-benzyl sulphonic acid is employed in my process, a coloring-matter is obtained which produces a brown shade. If the para-mono-nitro-benzyl-sulphonic acid be employed, a coloring-matter is obtained which produces a yellow shade, and if mixtures of these two acids be employed then the resulting coloring-matter produces a shade lying within the range of yellow to brown, depending upon the composition of such mixture. The fabric so dyed is not essentially affected in shade when suitably treated in the customary manner with bichromate of potash and acetic acid. When treated with nitrous acid and then with betanaphthol in the manner usual for developing color upon dyed fibre the shades of the dyed fabric all become more reddish in color.

#### RED AZO DYE.

Conrad Schraube and Walter Voigtlaender-Tetzner, of Ludwigshafen-on-the-Rhine, Germany, assigns to Badische Anilin and Soda Fabrik. Patent No. 718,389, dated January 13, 1903.

This invention relates to a coloring-matter which dyes wool a red shade which is of remarkable fastness to fulling.

In carrying out this invention one molecular proportion of benzidine is converted into its tetrazo compound, and this is combined with one molecular proportion of 2-naphthol-6.8-disulpho-acid, and the diazo-azo substance so resulting is suitably combined with one molecular proportion of para-cresol. In place of benzidine tolidine may be employed with



equally good results. The shade produced by this product is, however, of a slighty bluer cast than the product obtained from benzidine.

#### YELLOW AZO DYE AND PROCESS OF MAKING SAME.

Friedrich Runkel, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co. Patent No. 719,048, dated January 27, 1903.

This invention relates to the production of new valuable azo dyestuffs by combining indol compounds—such as Pr<sub>1</sub>-methylindol (alpha-methylindol), B<sub>2</sub>-Pr<sub>2</sub>-dimethylindol, B<sub>2</sub>-chloro-Pr<sub>2</sub>-methylindol, or their derivatives alkylated in the imido group or the like—with diazo compounds containing sulphonic groups. The said indol derivatives can be prepared according to the method of E. Fischer by melting together the corresponding keto-hydrazones and zinc chloride.

The claim specifies the dyestuff obtained from alphamethylindol and parasulphanilic acid which is a yellow powder, soluble in water, alcohol and ammonia with a yellow color. It is dissolved by concentrated sulphuric acid of 66° Baumé with a yellow color. It dyes wool greenish-yellow shades fast to the action of light, acids and alkalies.

#### YELLOW AZO DYE AND PROCESS OF MAKING SAME.

Friedrich Runkel, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co. Patent No. 719,049, dated January 27, 1903.

This invention relates to the production of new valuable azo dyestuffs by combining the hitherto unknown sulphonic acids of the indol group with aromatic diazo compounds, such as diazobenzene, diazonaphthalene, diazoazobenzene, or the like. The said new sulphonic acids of the indol series containing the sulphonic groups in the benzene nucleus can be obtained by treating with sulphonating agents indol derivatives, such as

(4)

alpha-methylidol (Pr<sub>2</sub>-methylindol), B<sub>2</sub>-Pr<sub>2</sub>-dimethylindol, or derivatives thereof substituted in the benzene nucleus or alkylated in the imido group or the like.

The claim specifies the coloring matter obtained from the sulphonic acid of alphamethylindol and orthotoluidine. This is a yellow powder, soluble in water, alcohol and ammonia with a yellow color. It is dissolved by concentrated sulphuric acid of 66° Baumé, with an orange-yellow color, and dyes wool yellow shades very fast to light.

#### ALKYLATED AURAMINS AND PROCESS OF MAKING SAME.

Carl Hoffmann, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 720,920, dated February 17, 1903.

The inventor has found that auramine may be substituted by an alkyl in the keton-imid group by heating the auramine base with an alkylhalide while adding an agent capable of combining acids. Thus a series of new auramines is obtained, which form yellow-tinted salts and dye cotton yellow shades. The new auramines are insoluble in water, soluble with some difficulty in ether, and readily soluble in chloroform or hot alcohol. On treating these alkylauramines with dilute mineral acids and reducing agents they have the same behavior as auramines. They are decomposed into alkylamine and tetra-alkyldiamido-benzophenon or transformed into colorless compounds, respectively.

The general method for obtaining the new alkyl derivatives of auramine consists in treating the auramine base (tetraalkylpara-diamido-benzophenon-imid) in the presence of an agent capable of combining with acids with the corresponding quantity of an alkylhalide. It is best to use as additions lime, magnesia, zinc or mercuric oxide. It is preferable to operate in the presence of an indifferent solvent, such as benzene, toluene or xylene.

The claims specify benzylauramine obtained by heating an auramine base (tetraalkyl-para-diamido-benzophenon-imid) in the presence of an agent capable of combining acids with an equivalent quantity of benzyl chloride.

#### YELLOW SULPHUR DYE AND PROCESS OF MAKING SAME.

Christopher Ris and Albert Mylius, of Basle, Switzerland, assignors to Anilin Color and Extract Works, formerly John R. Geigy. Patent No. 722,630, dated March 10, 1903.

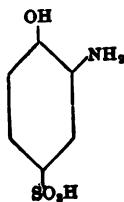
The present invention relates to the production of new yellow sulphur dyestuffs, which may be obtained by melting the formylated derivatives of metatoluylenediamine with sulphur, to which melt there may be added some other substances, especially benzidine and its derivatives or metatoluylenediamine. Both monoformyl-metatoluylenediamine and diformyl-metatoluyenediamine can be used to perform the reaction. These formyl derivatives are to be obtained by boiling the said base with formic acid for several hours in a reflux apparatus. When crystalized from boiling water, the monoformyl-metatoluylenediamine forms transparent pyramids of the melting-point of 113° to 114° centigrade, while diformyl-metatoluylenediamine is obtained in white needles, melting at 176° to 177°c. These dyestuffs dye unmordanted cotton yellow shades from a bath containing sodium sulphide.

#### WOOL-DYE AND PROCESS OF MAKING SAME.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 722,715, dated March 17, 1903.

This invention relates to the production of a new and valu-

able azo dyestuff by combining the diazo derivative of ortho-amidophenolpara-sulphonic acid having the formula:



with 1.5 dioxynaphthalene.

It dyes wool from acid-bath violet-red shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to deep black, distinguished for great fastness, to the “potting process.” They also resist milling and washing and possess a good fastness against the action of light.

#### WOOL-DYE AND PROCESS OF MAKING SAME.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 722,716, dated March 17, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo derivatives of ortho-amido-cresol sulphonic acids, such as the ortho-amido-ortho-meta and para cresol sulphonic acids with 1.5-dioxynaphthalene.

The claim specifies the product from ortho-amido-para-cresol sulphonic acid which dyes wool from acid-bath violet-red shades. By subsequently treating the dyed fibre with chromium compounds reacting as oxidizing agents—such as chromates,

bichromates, or the like—the shades are changed to deep black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

#### BLUE POLYAZO DYE AND PROCESS OF MAKING SAME.

Ivan Levinstein and Carl Mensching, of Manchester, England, assignors to Levinstein, Limited. Patent No. 722,860, dated March 17, 1903.

The inventors have found that by heating alpha,alpha,naphthylamin sulphonic acid under suitable conditions with benzylchloride a new benzylnaphthylamin sulphonic acid is produced and that by combining this acid with diazo derivatives of amidoazo compounds is obtained a very valuable series of coloring-matters which produce on wool shades which are brighter and bluer than those produced by the corresponding coloring-matters from the unbenzylated acid.

These coloring-matters form dark black powders which dissolve in water forming blue solutions and which dye wool in an acid-bath in brilliant blue shades.

#### GREEN ANTHRACENE DYE AND PROCESS OF MAKING SAME.

Oscar Bally, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 723,125, dated March 17, 1903.

According to a previous invention sulphonated coloring-matters of the anthracene series can be obtained by condensing the sulpho-acids of aromatic amido bodies with nitroanthraquinone derivatives. It is now found that these condensation products can easily be transformed into halogen derivatives

soluble in water which are of themselves coloring-matters and are also capable of condensing with aromatic amines to form new coloring-matters of various shades. These new halogen bodies can be prepared by treating the aforementioned sulphonated coloring-matters in the condition either of the free acid or of their salts with chlorine or bromine in aqueous solution or suspension or in the dry condition. The condensation of the halogen bodies thus formed with amido bodies can be effected by melting them with the amine chosen, or the solution—for instance, in water—of the halogenized sulphonic acid can be boiled with the amido body for a sufficient length of time or preferably heated under pressure in a closed vessel, whereby the addition of such bodies as sodium acetate or calcium acetate, sodium carbonate and the like frequently affects the reaction in a favorable manner. The new coloring-matters thus obtained can be employed for dyeing mordanted and unmordanted wool green shades. They are as a rule sufficiently soluble in water for dyeing purposes; but if not they can be further sulphonated in the known manner.

#### BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Richard Herz, of Frankfort-on-the-Main, Germany, assignor to Leopold Cassella & Co. Patent No. 723,154, dated March 17, 1903.

The inventor has found that very valuable blue dyestuffs dyeing cotton direct can be produced by heating the hitherto unknown phenylparaamido paraoxydiphenylamine with polysulphides. The paraamido paraoxydiphenylamine is obtained by reducing the product of oxidation of equimolecular proportions of paraamidodiphenylamine and phenol or equimolecular proportions of paraamidophenol and diphenylamine.

These dye unmordanted cotton bright indigo-blue shades, which are fast to washing, acids and light.

**BROWN SULPHUR DYE AND PROCESS OF MAKING SAME.**

Hans Ebeling, of Biebrich, Germany, assignor to Kalle & Co. Patent No. 723,448, dated March 24, 1903.

The inventor has discovered that the amido derivatives of metatoluylenediamine when melted with sulphur and sodium sulphide yield very valuable dyes, which dye cotton without a mordant permanent brown shades. An especially remarkable feature of these dyes is that the dyeing effected with them does not require any subsequent treatment and is distinguished by its being particularly fast against the action of light. In this respect the new dyes differ advantageously from the brown coloring-matters containing sulphur hitherto in the market. These new dyes have, further, the property of being capable of being diazotized on the fiber and developed with the usual developers—such as, for instance, beta-naphthol, metatoluylenediamine, or resorcinol.

In preparing the new dyes it is not necessary to introduce into the melt the ready-made isolated amido derivatives of the metatoluylenediamine, as the same result can be obtained by melting those azo dyes which are obtained by the combination of metatoluylenediamine with diazo compounds of readily-volatile amins. Such azo dyes are, for instance, aniline-azo metatoluylenediamine and aniline-disazo metatoluylenediamine.

**AZO DYE AND PROCESS OF MAKING SAME.**

Albert Bertschmann, of Basle, Switzerland, assignor to the firm of Society of Chemical Industry in Basle. Patent No. 724,078, dated March 31, 1903.

The invention relates to the manufacture of new nitrobenzamidonaphtholsulphonic acids, of the corresponding amidobenzamidonaphtholsulphonic acids, and of new azo coloring-matters derived from these latter.

The new nitrobenzamidonaphtholsulphonic acids are ob-

tained by the action of the chlorides of nitrobenzoyls on the 2.5.7 amidonaphtholsulphonic acid, while the corresponding new amidobenzamidonaphtholsulphonic acids are obtained by treatment of the said nitrobenzamidonaphtholsulphonic acids with reducing agents. The amidobenzamidonaphtholsulphonic acids, which are characterized by inclosing a diazotable amido group in the residue aliphylacidyl not hydroxylated, constitute valuable primary materials for the preparation of azo coloring-matters capable of being developed on the fiber. These amidobenzamidonaphtholsulphonic acids, which can be precipitated in a general way from their solutions in the form of alkaline salts by means of common salt or in the form of free acids by means of hydrochloric acid, are clearly distinguished from the amidonaphtholsulphonic acids from which they are derived in that they can by nitrous acid be transformed into diazo compounds, which by treatment with alkalis furnish red-yellow to red-blue coloring-matters and not violet to black coloring-matters, as do the diazo derivatives of the amidonaphtholsulphonic acids.

The azo coloring-matters resulting from the combination of the amidobenzamidonaphtholsulphonic acids with diazo bodies dye unmordanted cotton in yellow-red to blue-red tints and have the property of developing well on the fiber by being diazotized thereon and ultimately combined with amines or phenols, furnishing shades which are distinguished not only by their extreme fastness to washing, but also by their intensity and brilliance.

#### RED AZO DYE AND PROCESS OF MAKING SAME.

Carl Schirmacher, of Soden, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 724,743, dated April 7, 1903.

The inventor has found that by combining diazotized paranitranilinhomosulphonic acid with betanaphthol a red azo dye-



stuff may be obtained, which is of great value for the manufacture of color-lakes. The hitherto unknown para-nitranilin-homosulphonic acid may be obtained from ortho-chlorobenzylchloride by first transforming the last-named compound with sulphite into ortho-chlorobenzylsulphonic acid, by then nitrating this acid in concentrated sulphuric acid to mononitro-chlorobenzylsulphonic acid, and by finally heating the latter with ammonia to 150° centigrade. The ammonical salt of para-nitranilin-homosulphonic acid is obtained as a yellow powder, readily soluble in hot water.

#### BLUE DYE AND PROCESS OF MAKING SAME.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 724,789, dated April 7, 1903.

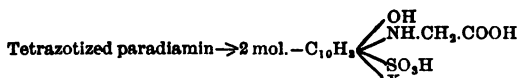
This invention relates to developments and improvements of the invention patented to the inventor by Letters Patent No. 682,523, September 10, 1901. The inventor has found that the coloring-matter obtained as described in the specification of the said Letters Patent is not always of a homogeneous character, but may consist of or contain two distinct bodies, and these can be separated from one another by suitable means; and the final object of the present invention is the production of the two bodies in a commercially pure state and either in their reduced or in their unreduced form.

#### VIOLET AZO DYE AND METHOD OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin & Anilinfarben Fabrik. Patent No. 724,893, dated April 7, 1903.

This invention is based on the discovery that by combining a tetrazotized paradiamine with two molecules of the glycine of an amidonaphthol sulphonic acid violet to blue coloring-

matters are obtained, the constitution of which is represented by the following formula:



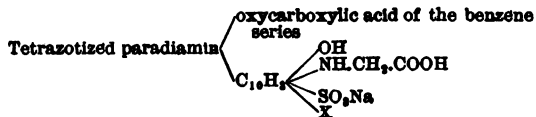
"X" meaning a hydrogen atom or a sulpho group. These coloring-matters dye on cotton violet to blue shades of very bright tints. As paradiamines there may be used benzidine, tolidine, dianisidine and paraphenylenediamine, and as glycines those of the amidonaphthol sulphonic acids susceptible of combining with diazo compounds.

The claim specifies the dyestuff obtained by the combination of benzidine with two molecules of the glycine of the 2.5-amidonaphthol-7-sulphonic acid. This dyes unmordanted cotton a bright violet.

#### RED TO VIOLET DYESTUFF AND METHOD OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin and Anilinfarben-fabrik. Patent No. 724,894, dated April 7, 1903.

This invention relates to the production of disazo dyes obtained by the combination of the intermediate products from paradiamines and the oxycarboxylic acids of the benzene series with glycins of the amidonaphthol sulphonic acids, the constitution of which is represented by the following formula:



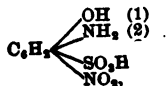
"X" meaning a hydrogen atom or a sulpho group. As paradiamines may be used, benzidine, tolidine, dianisidine, para-

phenylenediamine, as oxycarboxylic acids—those of the benzene series and their homologues, as glycins, those of the amidonaphthol sulphonic acids susceptible of combining with diazo compounds. The resulting coloring-matters dye unmordanted cotton red to violet shades of great fastness to light and acids. They may further be employed for dyeing wool and for preparing fast color lakes. The claims specify the dyestuff from benzidine, salicylic acid and the glycine of 2.5 amidonaphthol sulphonic acid.

#### BLACK AZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York., N. Y. Patent No. 725,848, dated April 21, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of nitro-ortho-amidophenol monosulphonic acids having the formula:



such as ortho-amidophenol-ortho-nitro-para-sulphonic acid, ortho-amidophenol-para-nitro-ortho-sulphonic acid, or the like—with 1.5 dioxynaphthalene. The new azo dyestuffs thus obtained are brownish-black powders soluble in water with a violet color turning blue on adding a small quantity of caustic-soda lye, dyeing wool from acid-bath bluish-violet shades turning black by a subsequent treatment with chromium compounds reacting as oxidizing agents. The black shades thus obtained possess a great fastness.

The claim specifies the dyestuff derived from ortho-amidophenol-ortho-nitro-para-sulphonic acid and 1.5-dioxynaphthalene.

## BLUE BASIC DYE AND PROCESS OF MAKING SAME.

Emile A. Fourneaux, of New York, N. Y., assignor to Herman A. Metz, of Brooklyn, New York. Patent No. 726,667, dated April 28, 1903.

The inventor has found that valuable new blue basic dyes of great fastness can be obtained by treating the asymmetrical dimethyl or diethylphenosafranins in ice-cold acid solution with an alkaline nitrite, using the same in the proportion of one-half molecule to one molecule of the safranin and then transposing the intermediary product formed by allowing the neutral or slightly-acid solution to stand for some time at ordinary temperature or by heating it to the boil, or both.

By treating one molecule of dimethylphenosafranin with one molecule of an alkaline nitrite in acid solution the safranin is transformed into a diazo compound which is well known and which has been used for the manufacture of dyes by copulating it with amins or phenols. Like most diazo compounds, the one derived from dimethylphenosafranin is unstable and decomposed by heating or even if its solution is allowed to stand for some time at ordinary temperature. The products of this decomposition have not been studied. Normally it should yield the dimethylaminobenzolindon or dimethylphenosafraninon, which has been synthetically prepared by Jaubert, which forms red crystals and possesses no tinctorial value. As a matter of fact, however, this product is not formed by the decomposition of this diazo compound.

On standing at ordinary temperature or by boiling the light-greenish-blue solution of the diazo compound it gradually turns a dark purplish blue, while nitrogen is given off in gas form. From this dark-blue solution a new blue basic dye can be precipitated by the addition of common salt and zinc chloride. This dye, however, is also of little tinctorial value, as it gives dull and weak gray-blue shades.

Far better results are obtained when the proportion of nitrite used in the reaction is reduced to one-half molecule

as against one molecule of the safranin. In this case a valuable dark purplish blue is formed, which is the object of the present application. When substituting the asymmetrical diethylphenosafranin for the dimethyl, very similar results are obtained throughout.

In preparing these dyes it is necessary in order to obtain the best results to use strictly only one-half molecule of the alkaline nitrite to one molecule of the safranin. Otherwise a certain proportion of the undesirable grayish-blue dye described above is formed, to be detriment of the brightness and strength of the dye. When less than one-half a molecule of nitrate is used, a certain amount of the safranin remains unchanged, which is equally detrimental to the result.

#### INDIGO MIXTURE AND PROCESS OF MAKING SAME.

Benno Homolka, of Frankfort-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 726,688, dated April 28, 1903.

It is known that by condensing ortho-nitro-benzaldehyde with acetone in the presence of small quantities of dilute alkalies ortho-nitrophenyl-beta-lactic acid methyl ketone is obtained, which on treatment with an excess of alkali yields indigo.

This invention relates to the manufacture of soluble products from ortho-nitrophenyl-beta-lactic acid methyl ketone and salts of benzylaniline sulphonic acids.



That is to say, it has been found that mixtures of ortho-nitrophenyl-beta-lactic acid methyl ketone with the salts of these sulphonic acids are readily soluble in water. For benzylanilin-sulphonic acids may be substituted their homologues, such as benzytoluidin-sulphonic acids



or their substitution products, such as chlorobenzylanilin-sulphonic acids



The quantity of benzyaniline (or toluidin) sulphonate requisite for obtaining with a given quantity of ortho-nitrophenyl-beta-lactic-acid methyl ketone a practicable and sufficiently soluble product may be increased, if desired, but is limited to a certain minimum, to be ascertained in every special case. In general, sufficiently soluble products are obtained if about one molecular proportion of benzyaniline (or toluidin) sulphonate is allowed to act on two molecular proportions of ortho-nitrophenyl-beta-lactic acid methyl ketone. The products thus obtained are easily soluble in hot water and absolutely stable. Thus they meet all requirements for the purposes of dyeing and printing indigo. It is not advisable to take less than the above-mentioned minimum quantity of benzyl-aniline-sulphonate. Mixtures thus prepared are still soluble in warm water, but when cold are liable to become turbid, or the ortho-nitrophenyl-beta-lactic acid methyl ketone may separate in crystals.

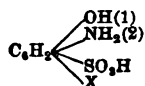
The homologues of ortho-nitrophenyl-beta-lactic acid methyl ketone, especially ortho-nitrotolyl-beta-lactic acid methyl ketone obtained from the two known ortho-nitrotolylaldehydes, behave similarly toward benzyaniline (or toluidin) sulphonates.

#### BLACK AZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 726,695, dated April 28, 1903.

This invention relates to the production of new and valuable

azo dyestuffs by combining the diazo compounds of o-amidophenol derivatives having the following general formula:



(X meaning a halogen atom or a sulphonic group), such as ortho-amidophenol-para-chloro-ortho-sulphonic acid, ortho-amidophenol-ortho-para-disulphonic acid, or the like, with 1.5-dioxynaphthalene.

The claim specifies the dyestuff from o-amidophenol-para-chloro-o-sulphonic acid. It dyes wool from acid-bath violet shades. By subsequently treating the dyed fibre with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to deep black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

#### BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Emil Kraus, of Basle, Switzerland, assignor to Society of Chemical Industry in Basle. Patent No. 727,387, dated May 5, 1903.

The alphy paraamidoparaoxydialphy lamido compounds, as alphy paraamidoparaoxydiphenylamin and its derivatives and homologues, as well as the indophenols corresponding to these leucoindophenols, have not yet been utilized to produce sulphur dyestuffs. This depends probably on the fact that these bodies have been only difficultly and seldom quite entirely accessible according to the methods usually employed for the manufacture of indophenols. The inventor claims that these compounds, which constitute very valuable parent ma-

terials for the production of blue sulphur dyes, may be produced in a simple way and in a good output by the condensation of parantrosophenols with aliphylated aromatic amines—as, for instance, the diphenylamine, the methyldiphenylamine, etc., in strong sulphuric acid and by reduction of the obtained condensation products with a reducing agent—such as, for example, sodium sulphide or zinc powder. The new dyestuffs obtained by heating these aliphylparaamidoparaoxydialphylamido compounds with polysulphides distinguish themselves by a beautiful indigo tint, great affinity for cotton fibres, and eminent fastness to milling.

The claims specify the dyestuff made from phenylparaamidoparaoxydiphenylamine.

#### BLUE DYE AND PROCESS OF MAKING SAME.

Heinrich Laubmann, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 727,389, dated May 5, 1903.

The inventor claims that by the action of sulphuric dialkylesters on anthrachryson or its alkali salts new anthrachrysondialkylethers may be obtained which by sulphonation and subsequent nitration may be transformed into the corresponding dinitroanthrachrysondialkyletherdisulphonic acids. By reducing these acids diamidoanthrachrysondialkyletherdisulphonic acids are obtained which have the property of dyeing unmordanted wool blue in an acid-bath.

#### AZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 727,962, dated May 12, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining with 2,6-dioxynaphthalene the diazo compounds of ortho-amidophenol-sulphonic acids such as ortho-



amidophenol sulphonic acids, ortho-amidocresol sulphonic acids, ortho-amidophenol-nitro-sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol disulphonic acids, or the like.

The claim specifies the dyestuff from ortho-amidophenolpara-sulphonic acid. It dyes wool from acid bath bluish-red shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

#### AZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Co., of New York, N. Y. Patent No. 727,963, dated May 12, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of ortho-amidophenol derivatives, such as ortho-amidophenol or cresol sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol-orthopara-disulphonic acid, or the like, with 1.7 amidonaphthol.

The claim describes the dyestuff from ortho-amidophenolpara-sulphonic acid. It dyes wool from acid-bath violet shades. By subsequently treating the dyed fiber with chromium compounds, reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to black distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

#### MONOAZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 727,964, dated May 12, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of nitro-amidophenol sulphonic acids such as ortho-amidophenol-ortho-nitropara sulphonic acid, ortho-amidophenol-para-nitro-ortho-sulphuric acid or the like with 1.7-amidonaphthol.

The claim covers the dyestuff from ortho-amidophenol-ortho-nitro-para sulphonic acid, which dyes wool from acid-bath blue shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates or the like—the shades are changed to black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

#### AZO DYE.

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This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of ortho-amidophenol-sulphonic acids such as ortho-amidophenol-sulphonic acids, ortho-amidocresol-sulphonic acids, ortho-amidophenol-nitro-sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol-disulphonic acids, or the like, with a 1.5 dioxy-naphthalene-3-sulphonic acid.

The claim covers the dyestuff from ortho-amidophenol-para-sulphonic acid. It dyes wool from acid-bath bluish-red shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to bluish-black distinguished for great fastness to the potting process. They also resist milling and washing and possess a good fastness against the action of light.

## MONOAZO DYE.

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This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of ortho-amidophenol-sulphonic acids, such as ortho-amidophenol-sulphonic acids, ortho-amidocresol-sulphonic acids, ortho-amidophenol-nitro-sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol-disulphonic acids, or the like, with 1.7-amido-naphthol-4-sulphonic acid.

The claim covers the dyestuff from ortho-nitro-ortho-amidophenol-para-sulphonic acid. This dyes wool from acid-bath blue shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a great fastness against the action of light.

## BLACK AZO DYE.

Myrtil Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 727,967, dated May 12, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of ortho-amidophenol-sulphonic acids, such as ortho-amidophenol-sulphonic acids, ortho-amidocresol-sulphonic acids, ortho-amidophenol-nitro-sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol-disulphonic acids, or the like, with 2.6-amido-naphthol.

The claim specifies the dyestuff from ortho-amidophenol-para-sulphonic acid. This dyes wool from acid baths reddish-

violet shades. By subsequently treating the dyed fiber with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to black distinguished for great fastness to the potting process. They also resist milling and washing and possess a great fastness against the action of light.

#### BLACK AZO DYE AND PROCESS OF MAKING SAME.

Albrecht Schmidt, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 728,021, dated May 12, 1903.

The inventor has found that monoazo dyestuffs easily obtained in the usual manner from 1:8:4-naphthylenediaminsulphonic acid may be transformed by the action of mineral acids into new azo dyestuffs, which apparently are derived from a 1:8-amidonaphtholsulphonic acid, whereas the monoazo dyestuffs from 1:8:4-naphthylenediaminsulphonic acid are very unstable, the dyestuff from picramic acid and 1:8:4-naphthylenediaminsulphonic acid, for instance, decomposing on the fiber on boiling, so that further dyeings in the same bath always appear yellow. The products obtained after treatment with mineral acids are quite stable, and therefore are themselves applicable as dyestuffs and are also capable of forming valuable disazo dyestuffs by combining with an amin, especially if the monoazo dyestuff employed as parent material was obtained by combining an amidosulphonic acid with 1:8:4-naphthylenediaminsulphonic acid.

#### AZO DYE AND PROCESS OF MAKING SAME.

Emil A. Fourneaux, of New York, N. Y., Assignor to Herman A. Metz. Patent No. 728,388, dated May 19, 1903.

This so-called "para-nitraniline red," paranitrobenzol-azo-beta-naphthol, is used in the manufacture of red lake and pigment colors; but being insoluble it cannot be used as such in the

finished state like other azo colors, but must be produced in the process of lake-making itself by coupling diazotized para-nitraniline with an alkaline beta-naphthol solution in the presence of a suitable base. This process is uncertain in its results. If it were possible to put this dye, para-nitrobenzol-azo-beta-naphthol, in such a form that it could be employed as such in the manufacture of lakes like any of the soluble azo colors, it would constitute a great improvement in the art of lake-making. The inventor has succeeded in preparing a product consisting, mainly and essentially, of para-nitrobenzol-azo-beta-naphthol which not only fulfils that condition, but also produces lakes possessing a far more desirable and bluer cast of shade than those obtained from diazotized para-nitraniline and beta-naphthol and great fastness to light. Such a product can be obtained, for instance, by mixing solutions of equimolecular amounts of the dye from diazotized sulphanilic acid and beta-naphthol and para-nitrodiazobenzol and allowing these compounds to react on each other. The reaction will take place in the main as follows: The para-nitrodiazobenzol will combine with the beta-naphthol, eliminating the diazobenzolsulphonic acid and forming para-nitrobenzol-azo-beta-naphthol, which under these conditions appears in a form very materially different from that in which it is obtained by the direct copulation of para-nitrodiazobenzol with beta-naphthol. In this new form the dye appears as a thin gelatinous paste, which is insoluble in water, but so extremely finely divided that it reacts readily with metallic salts, just as if it were soluble. A similar product can also be obtained by mixing solutions of equimolecular amounts of para-nitrodiazobenzol and other diazo compounds—for instance, para-diazobenzolsulphonic acid—and allowing the mixture to run into an alkaline beta-naphthol solution. The products obtained by these methods are purified by adding common salt, which facilitates the filtering, and then washing the filtered product with a diluted salt solution. The product

is then reduced to paste form, in which form it is applied for the manufacture of lakes.

It is obvious that the sulphanilic acid can be replaced by other similar compounds, which play only a secondary part in this process, and that other nitrodiazo compounds can be used instead of the para-nitrodiazobenzol.

#### AZO DYE AND PROCESS OF MAKING SAME.

Emile A. Fourneaux, of New York, N. Y., assignor to Herman A. Metz, of Brooklyn, New York. Patent No. 728,455, dated May 19, 1903.

In United States Patent No. 728,388 it is shown that the azos derived from diazotized nitroamino compounds and beta-naphthol, which being insoluble are not suitable for the manufacture of lake and pigment colors, as such in the finished state can be made available for this purpose by combining the nitrodiazo compound with beta-naphthol in the presence of a diazo compound derived from an aminosulphonic acid or by the action of a nitrodiazo compound on an azo dye derived from a diazosulphonic acid and beta-naphthol.

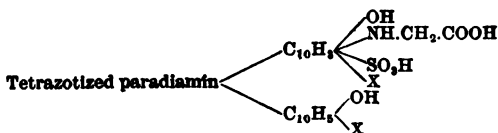
The inventor has since found that similar and even more valuable substances, which consist in the main of the azo dyes derived from nitrodiazo compounds and beta-naphthol in such and extremely fine state of division that they will react readily with metallic salts, forming lakes, can also be obtained by coupling the nitrodiazo compound with a mixture of beta-naphthol and other phenolic bodies, especially the sulphonic and carboxylic acids of phenols, provided that these latter bodies are used in sufficient quantities. The operation is best conducted in the ordinary way by slowly pouring the solution of the nitrodiazo body into an alkaline solution of a mixture of beta-naphthol and other phenolic body while stirring constantly, the amount of alkali being such that the reaction of the liquid is slightly alkaline after coupling. It is also desirable to use the diazo compound in such a proportion that it will

just saturate the total of the phenolic bodies. In other words, for one molecular proportion of the diazo compound it is best to use such quantities of beta-naphthol and the other phenolic body that they sum up to one molecular proportion. Supposing, for instance, that one molecular proportion of paranitrodiazobenzol and beta-naphthol and beta-naphtholmonosulphonic acid F be used in the proportion of three parts of the former to one part of the latter, it would be advisable to use three-fourths of a molecular proportion of beta-naphthol and one-fourth of a molecular proportion of beta-naphtholsulphonic acid F and a sufficient amount of alkali to insure a neutral or slightly-alkaline reaction of the liquor after the combination has taken place.

#### BLUE DISAZO DYE.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin & Anilinfarben-Fabrik. Patent No: 728,477, dated May 19, 1903.

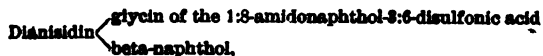
This invention is based on the discovery that new disazo dyestuffs are obtained by combining the intermediate products from paradiamins and the glycins of amidonaphthol sulphonic acids with beta-naphthol or naphthol sulphonic acids, the constitution of these dyestuffs being represented by the following general formula:



"X" meaning the hydrogen atom or a sulpho group. As paradiamins may be employed benzidin, tolidin, dianisidin, paraphenylenediamin, and as glycins those of the amido-naphthol sulphonic acids susceptible to combining with diazo com-

pounds. The coloring-matters thus resulting dye unmordanted cotton in pure-blue shades distinguished by good fastness to light and acids.

The claim covers the dyestuff of the following constitution:



#### BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Albrecht Schmidt and Fritz Bethmann, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 728,623, dated May 19, 1903.

The inventors find that such diphenylamin bodies as are derived from dialkyl-para-phenylenediamin, on the one hand, and ortho-ortho-dichlorphenol, on the other hand, yield blue sulphurized dyestuffs when heated with sulphur—as, for instance, with sodium sulphide and sulphur—at and above about 95° centigrade, which no longer contain chlorine. The parent materials which have not hitherto been described are obtained, for instance, by oxidizing dialkyl-para-phenylenediamin and ortho-ortho-dichlorphenol and reducing the dichlorinated indophenol thus obtained. They may also be obtained by reducing the indophenols derived from the oxidation of ortho-ortho-dichlor-para-amidophenol and dialkyl-anilines also by heating dichlor-para-amidophenol with dialkyl-para-phenylenediamin hydrochlorides. They also further found that the manufacture of ortho-ortho-dichlorphenol may be combined with that of indophenol in a single operation by dissolving phenol in alkali and allowing to run into it the quantity of chloride of lime or a solution of sodium hypochlorite calculated for ortho-ortho-dichlorphenol, then after the reaction adding the calculated quantity of a dimethyl-para-phenylenediamin solution and oxidizing the mixture with a hypochlorite, potassium ferricya-



nide, or another oxidizing agent to indophenol. This is then isolated and reduced with sodium sulphide to the leuco compound.

#### ANTHRACENE DYE.

Max Kugel, of Wiesdorf, Germany, Assignor to Farbenfabriken, of Elberfeld Co., of New York, N. Y. Patent No. 729,073, dated May 26, 1903.

This invention relates to the manufacture of new dyestuff sulphonic acids of the anthracene series by causing sulphonating agents to act on certain anthraquinone derivatives. The said bodies, which are most probably oxazine derivatives, are obtained by causing oxidizing agents to act on such alpha-aphylamidoanthraquinones or derivatives thereof as contain a hydroxy group in ortho position to the alpha-aphylamido group, such as 1-toluido-2-oxyanthraquinone, 1-anilido-2-oxy-3-bromoanthraquinone, 1-anilido-2-4-dioxyanthraquinone, 1-5-dianilido-2-4-6-8-tetraoxyanthraquinone, or the like. The new dyestuff sulphonic acids obtained by the sulphonation of these bodies are in the shape of their alkaline salts colored powders, which are soluble in hot water with from violet to greenish-blue color. They dye unmordanted wool from violet to greenish blue and chrome-mordanted wool from violet to green shades.

#### PROCESS OF MAKING BROM INDIGO.

Arnold Rahtjen, of Hamburg, Germany. Patent No. 729,217, dated May 26, 1903.

The inventor claims that, contrary to existing views and contrary to experiments made by others, brom derivatives of indigo are directly obtained from indigo of natural or artificial origin by adopting the usual methods which are applied to substitute the H atoms in the aromatic series of bromine.

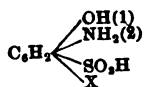
The finely-powdered indigo is well saturated with organic or inorganic acids or with carbon bisulphide (CS<sub>2</sub>) or such like

suitable liquids, to which is added a solution of the proper proportion of bromine which has been mixed with the same solvent as used for saturating the indigo. The mixture is well stirred, and after the bromine is absorbed the brom indigo is separated, washed and dried.

#### AZO DYE AND PROCESS OF MAKING SAME.

Myrtill Kahn, of Elberfeld, Germany, assignor to Farbena-briken, of Elberfeld Co., of New York, N. Y. Patent No. 729,601, dated June 2, 1903.

This invention relates to the production of new and valuable azo dyestuffs by combining the diazo compounds of ortho-amidophenol sulphonic acids having the general formula:



(X meaning a hydrogen atom which can be replaced by halogens—NO<sub>2</sub>—SO<sub>3</sub>H, or—CH<sub>3</sub>)—such as ortho-amidophenol sulphonic acids, ortho-amidocresol sulphonic acids, ortho-amidophenol-nitro-sulphonic acids, ortho-amidophenol-chloro-sulphonic acids, ortho-amidophenol disulphonic acids, or the like—with 1:5-amidonaphthol.

The claim specifies the product from ortho-amidophenol para-sulphonic acid. This dyes wool from acid-baths brownish-violet shades. By subsequently treating the dyed fibre with chromium compounds reacting as oxidizing agents—such as chromates, bichromates, or the like—the shades are changed to black, distinguished for great fastness to the potting process. They also resist milling and washing and possess a great fastness against the action of light.

**OLIVE-GREEN SULPHUR DYE AND PROCESS OF MAKING  
SAME.**

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin & Anilinfarben Fabrik. Patent No 729,874, dated June 2, 1903.

The inventor claims that by treating diformylmeta-phenylen-diamin with sulphur and sodium sulphide under suitable conditions very valuable dyestuffs of a great coloring power are obtained which dye cotton in a bath containing sodium sulphide olive-green shades very fast to light and soap. If a condensing agent is added to the melt—for instance, salts of heavy metals—the properties of the resulting coloring-matters may be improved. Thus by adding zinc chloride a dyestuff of a purer and more greenish tinge is obtained.

**INDIGO COLORING-MATTER CONTAINING HALOGEN  
AND PROCESS OF MAKING SAME.**

Paul Erwin Oberreit, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin and Soda Fabrik. Patent No. 730,148, dated June 2, 1903.

This invention relates to new indigo coloring-matters containing bromine, and process of producing the same. These products will hereinafter be referred to by the generic term "brominated indigo."

The process employed in this invention consists, essentially, in converting brominated phenyl-glycocol-ortho-carboxylic acid into, for instance, acetylated brom indoxyl derivatives and finally converting these products into the corresponding brominated indigo coloring-matters. This can be carried into practical effect by treating a brom phenyl-glycocol-ortho-carboxylic acid (preferably in the form of its sodium salt) with, say, acetic anhydride, acting on this result (preferably in the dry and purified state) with, say, caustic-soda solution, and then blowing air through the so-obtained liquid. The brominated

phenyl-glycocoll-ortho-carboxylic acid employed can be obtained by direct bromination of phenyl-glycocoll-ortho-carboxylic acid itself or by brominating the nitrile of that acid namely, cyan-methyl-anthranilic acid, which is described in U. S. Patent No. 662,754, dated November 27, 1900—and subsequently converting the so-obtained product into brominated phenyl-glycocoll-ortho-carboxylic acid by suitable saponification.

#### YELLOW ACRIDIN DYE AND PROCESS OF MAKING SAME.

Karl Jedlicka, of Basle, Switzerland, assignor to the firm of Society of Chemical Industry in Basle. Patent No. 730,771, dated June 9, 1903.

In Letters Patent No. 537,723, dated April 16, 1895, is described the transformation of the sparingly soluble yellow acridin dyestuffs known as "acridin yellow" and "benzoflavin" into easily soluble products of more reddish tint, the process being based on the treatment of the said amidoacridins with alkylizing agents. It is now found that the same effect, namely, the transformation into easily soluble dyestuffs of more reddish tints, may also be produced by treating the leuco compounds corresponding to the said amidoacridins in the form in which they are obtained by heating a tetraamidoditolymethane base with dilute acid under pressure in solution in water and in the presence of mineral acids, especially of hydrochloric acid with acetic aldehyde. The new dyestuffs thus obtained differ from the amidoacridins (acridin yellow, benzoflavin, &c.) derived from the same leuco compounds, besides being of more reddish (yellow-orange to reddish-orange) tint by being already soluble in cold water.

The claim specifies the dyestuff obtained by treating the leuco compound corresponding to acridin yellow with acetic aldehyde, which produces on leather and mordanted cotton clear orange shades.

## PROCESS OF MAKING INDOXYL.

Paul Erwin Oberreit, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 731,385, dated June 16, 1903.

In the production on the large scale of indoxyl or indoxyl by acting with caustic alkali on phenyl-glycin-ortho-carboxylic acid the reacting materials are intimately mixed at ordinary temperature by grinding (care being taken to exclude water, as far as possible, from the materials, both before and during mixing), and the mixture is then heated. This grinding is, however, a tedious, expensive and at times uncertain operation, so that attempts have been made to dispense with it by mixing the materials in aqueous solution and evaporating off the water. Under these circumstances, however, a partial decomposition of the phenyl-glycin-ortho-carboxylic acid takes place, so that but little indoxyl is obtained from the melt.

The inventor claims that an aqueous solution of phenyl-glycin-ortho-carboxylic acid and caustic alkali can advantageously be employed for the production of indoxyl and indoxyl if the mixture be heated in a vacuum. The water evaporates without decomposition of the glycin salt taking place, and condensation to indoxyl or indoxyl is smoothly effected.

## BLUISH-VIOLET AZO DYE.

Adolf Israel and Oscar Dressel, Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co., New York, N. Y. Patent No. 731,460.

The claim covers the new azo dyestuff derived from chloro-para-phenylenediamin and 1,8-dioxynaphthalene 3,6 disulphonic acid, containing the chlorine atom in the molecule in meta position to the azo group. This dyestuff, in the shape of the sodium salt, is a grayish-black powder, soluble in water with a reddish-violet color, and dyes wool from acid-baths bluish-violet shades fast to light.

**GREEN SULPHUR DYE AND PROCESS OF MAKING SAME.**

Edward Culmann, of Buffalo, New York, assignor to Schoellkopf, Hartford & Hanna Company. Patent No. 731,669, dated June 23, 1903.

By this invention the hydrochloric-acid salt of amidoazobenzine or amidoazotoluene is melted, together with para-amidophenol, in about equal parts for about three hours at a temperature of about 180° centigrade. The melt of amidoazobenzine hydro-chlorid and para-amidophenol is soluble in a aqueous solution of caustic soda with a blue color, while the melt of amidoazotoluene hydrochloride and para-amidophenol dissolves in the same solution with a reddish-violet color. By boiling either of these melts with sodium sulphide and sulphur a green dyestuff is produced which dyes cotton directly in a bath containing sodium sulphide. By the addition of a copper salt a somewhat more brilliant dyestuff is produced.

**YELLOW MONOAZO DYESTUFF AND PROCESS OF MAKING SAME.**

Walter Dollfus and Rudolf Hagenbach, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 731,670, dated June 23, 1903.

By combining diazotized ortho-amido-para-sulphobenzoic acid with phenylmethylpyrazolon a yellow azo dyestuff is obtained which is particularly suited for the manufacture of insoluble yellow color-lakes fast to water, acid, lime and light, especially as regards the latter, if compared with the aniline dyestuffs hitherto used for this purpose.

When dry, the dyestuff is a yellow powder, soluble with difficulty in cold and readily soluble in hot water.

**BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.**

Ivan Levinstein and Herbert Levinstein, of Manchester, Eng-

land, assignors to Levinstein, Limited. Patent No. 732,090, dated June 30, 1903.

It is well known that certain mono-alkyl-leuco-indophenols when treated with sodium sulphide and sulphur under suitable conditions yield blue dyestuffs which dye unmordanted cotton bright blue shades, which are not very fast either to light or to washing.

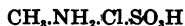
The inventors have discovered a process for preparing chlorinated mono-alkyl-leuco-indophenols and that these when treated under suitable conditions with sodium sulphide and sulphur yield dyestuffs which are in general similar to the corresponding unchlorinated dyestuffs, but are greatly superior to them both in fastness to light and to washing.

The dyestuff from para-ethyl-amidometatolyl-paraoxymeta-chlorophenylamin dyes unmordanted cotton from a bath containing sodium sulphide very bright indigo-blue shades, which are very fast to washing and to light.

#### RED AZO DYE AND PROCESS OF MAKING SAME.

Karl Schirmacher, of Soden, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 733,280. dated July 7, 1903.

If ortho-chlorotoluene-para-sulphonic acid is nitrated and subsequently reduced, an ortho-chlorotoluidin-para-sulphonic acid is obtained, wherein the substitutions



probably have the position 1.3.6.4. This chlorotoluidin sulphonic acid is little soluble in water. Its sodium salt crystallizes well. When diazotized, this acid yields a diazo compound, which partly separates from the solution if concentrated. It is now found that this diazotized chlorotoluidin sulphonic acid may be combined with beta-naphthol to a red azo dyestuff,

which is valuable on account of the lakes obtained from it—for instance, the baryum salt—which are distinguished by their shades and fastness.

#### GREEN ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Otto Hess, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning, of Höchst-on-the-Main, Germany. Patent No. 734,325, dated July 21, 1903.

The invention consists in the manufacture of new dyestuff-sulphonic acids of the anthra-quinone series which may be obtained by the action of sulphonating agents on dialphylamidodioxyanthraquinones. The latter are obtained by heating leuco-tetraoxyanthraquinones with primary aromatic amines—such as aniline, para-toluidine, xylidine and alphanaphthylamine and the like—in presence of salts of these amines. Leuco-tetraoxyanthraquinone is obtained by energetic acid reduction of para-dinitrodioxyanthraquinones.

When dry, the new dyestuff-sulphonic acids are green powders, soluble in water with a green color, which on addition of caustic alkalies turns to blue-green. The dyestuffs dye unmordanted wool green, the dyeings on chrome-mordanted wool being of a still more yellowish tint.

The claim specifies the anthraquinone dyestuff obtained by sulphonating dipara-toluidodioxyanthraquinone.

#### BLUE ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Eduard Hepp, of Frankfort-on-the-Main, and Christoph Hartmann, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 734,866, dated July 28, 1903.

The inventors have found that by nitrating the anthraquinone ortho-sulpho-acid and then reducing the products thus



obtained two new amidoanthraquinone sulpho-acids are obtained.

These amidoanthraquinone sulpho-acids when treated with halogens and then condensed with primary aromatic amins give new blue coloring-matters, being monosulpho-acids, which become very valuable if they are afterward sulphonated, and thus transformed into polysulpho-acids. The latter dye wool very pure blue shades.

The claims cover specific new anthraquinone dyestuff obtainable by sulphonating the condensation product of brominated amidoanthraquinone sulpho-acid 1.5 with paratoluidin.

#### SUBSTANTIVE SULPHUR DYE.

Paul Julius and Friedrich Reubold, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin & Soda Fabrik. Patent No. 735,775, dated August 11, 1903.

The claims cover:

1. The process of making substantive sulphurized dye, which consists in treating dinitro-meta-dichlor-benzene successively with a thionizing agent, and an aromatic amido-oxy substance, and then melting this result with sulphur and sodium sulphide.

2. The process of making substantive sulphurized dye, which consists in melting a thio derivative of nitro-hydroxy-dialphylamine with sulphur and sodium sulphide.

3. As a new article of manufacture, substantive sulphurized dye, which can be made from ortho-para-dinitro-thiocyan-parahydroxy-diphenylamine, sulphur and sodium sulphide, which in the dry and powdered state is of a black color soluble in water in the presence of sodium sulphide, giving a greenish-black colored solution, in which an excess of hydrochloric acid produces a blackish flocculent precipitate, practically insoluble in cold acetone, benzine, glacial acetic acid and in cold ethyl alcohol, and which dyes unmordanted cotton from a bath containing sodium sulphide shades which turn blue upon exposure to warm air.

## BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Richard Gley, of Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 736,380, dated August 18, 1903.

This invention relates to the manufacture of a new blue sulphur coloring-matter, which is obtained by melting para-dioxydiphenylamine with sulphur at a temperature above  $180^{\circ}$ . According to a publication of Schneider, by heating together para-dioxydiphenylamine and sulphur at  $180^{\circ}$  a blackish-brown product is obtained, which dissolves in caustic alkalies to a blue solution dyeing cotton blue tints. When following the directions given by Schneider, a product dissolving in alkalies to a blue solution may, indeed, be obtained; but this product has only a very feeble affinity for the fibre, and is, therefore, practically valueless as a coloring-matter. The inventor has found that a dyestuff of great intensity and affinity for the fibre is obtained by heating para-dioxydiphenylamine together with sulphur at a more elevated temperature—as, for instance, at above  $230^{\circ}$  to  $240^{\circ}$  C.

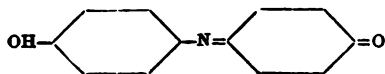
It is a bluish-black powder, insoluble in water, and dissolves in caustic alkalies with a blue, in alkali sulphide with a greenish-blue color, and dyes unmordanted cotton directly in a bath containing salt and sulphide indigo-blue shades of remarkable fastness.

## INDIGO BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Oskar Kaltwasser and Max Gaumer, of Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 736,403, dated August 18, 1903.

The claims are for:

1. The process for the production of an indigo-blue sulphur dye by heating the indophenol:



in a boiling aqueous solution with sulphur and sulphide of alkali in such proportions that upon one molecule of crystallized sodium sulphide at least four atoms of sulphur are employed.

2. The indigo-blue sulphur dye obtained as hereinbefore described, said dye being insoluble in water, dissolving in caustic alkalies with a dull greenish-blue color, in alkali sulphides with blue color and in warm concentrated sulphuric acid with violet color, producing on unmordanted cotton dull greenish-blue tints, which by subsequent treatment with oxidizing agents are transformed into indigo-blue shades of remarkable fastness.

#### REDDISH-BROWN AZO DYE.

Eduard Münch, of Ludwigshaffen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 737,445, dated August 25, 1903.

The inventors discovered a new azo coloring-matter obtained by combining diazotized anthranilic acid with para-cresol. It is of great value for the production of dyeings on animal fibre, which when treated with chromates or mixtures of chromates and chrome salts are converted into reddish-brown shades of great fastness.

#### PROCESS OF MAKING INDOXYL AND INDIGO PREPARATIONS.

Willibald Hentschel, of Radebeul, Germany, assignor to Chemische Fabrik von Heyden Actiengesellschaft. Patent No. 737,836, dated September 1, 1903.

This invention relates to an improvement in the process of manufacturing indoxyl and indigo preparations from phenylglycine, its homologues, and derivatives.

It is a well-known fact that the process for the formation of indigo from phenylglycine, which results from melting the last-named substance with alkali, fails by an insufficient yield of indigo. Also the addition of an earthy alkali, as burnt lime, does not sufficiently increase such yield. The owners of this process, therefore, had to replace this simplest way of producing indigo by the more indirect way of employing the anthranilic acid.

The object of the present invention is to obtain an increased yield of indigo; and it consists in heating the phenylglycine or its homologues or derivatives with caustic alkalies in the presence of an alkali-alcoholate and with or without the addition of oxides of the earthy alkalies.

#### VIOLET-RED AZO DYE AND PROCESS OF MAKING SAME.

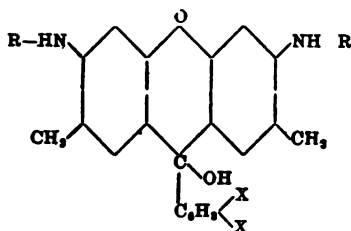
Friedrich Schmidt, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister, Lucius and Brüning. Patent No. 737,967, dated September 1, 1903.

The claims cover the process for the manufacture of a violet-red azo dyestuff, yielding, when dyed on wool and subsequently treated with chromic acid, fast-black shades, which consists in diazotizing beta<sub>1</sub>-naphthylamine-alpha<sub>1</sub>, alpha, beta<sub>1</sub>-trisulphonic acid, in treating this diazo compound with alkali carbonates, and in combining the naphthalene-2.1-diazo-oxide-5.7-disulphonic acid thus formed with beta-naphthol, and also the product which dyes wool violet-red, changing to blue-black on treatment with bichromates.

#### RED DYE.

Oscar Nastvogel, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 738,227, dated September 8, 1903.

This invention relates to the production of new and valuable dyestuffs, being salts of bases having the following general formula:



X meaning hydrogen atoms, which can be once or twice substituted by halogens, methyl or amido groups, R meaning an alkyl radical, such as methyl, ethyl, or the like.

The process for preparing the new coloring-matters consists in, first, condensing one molecule of benzaldehyde or one molecule of the halogen derivatives of benzaldehyde with two molecules of o-monoalkylamido-p-cresol; secondly, splitting off water from the resulting triphenylmethane compound, and, finally, oxidizing the pyrone thus produced to the dyestuff. The new coloring-matters thus obtained being salts of the dye bases with acids are when dry and pulverized from red to reddish-brown powders soluble in water and in alcohol with a red color, the alcoholic solutions showing fluorescence. They dye cotton mordanted with tannin, silk, or wool red shades.

#### ANTHRACENE DYE AND PROCESS OF MAKING SAME.

Max H. Isler, of Mannheim, Germany, assignor to the Badische Anilin & Soda Fabrik. Patent No. 738,614, dated September 8, 1903.

This invention relates to the production of blue to blue-green coloring-matters of the anthracene series.

The initial material can be prepared from a diamido-anthra-

quinone by suitable treatment with formic aldehyde and sulphurous acid according to the process of German Patent No. 112,115, and which is termed the sulpho-methylene derivative of diamido-anthraquinone. Now it is discovered that when the so-resulting product is treated with a halogenizing agent a corresponding halogen derivative of the said sulpho-methylene derivative results, which halogen derivative on suitable treatment with an aromatic amine—such as aniline, paratoluidine, etc.—and subsequent sulphonation yields the new coloring-matter, which dyes wool in shades within the range of from blue to blue-green.

#### RED MORDANT AZO DYE.

Otto Ernst and Franz Scholl, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Brünig. Patent No. 739,069, dated September 15, 1903.

The inventors have found that a series of orange-yellow azo dyestuffs, becoming red on treatment with chromium, may be obtained if 1-phenyl-5-pyrazolone and its derivatives, non-substituted in the fourth position, be combined with the diazo compounds of ortho-amido-cresol-sulphonic acids. The azo dyestuffs thus obtained are of a bluer and purer shade on transforming their acid dyes on wool into chrome lakes after the usual methods than the dyestuffs obtained from ortho-amidophenol derivatives; but the directly-acid dyeings are also of valuable orange-yellow shades. The beforementioned red chrome lakes are distinguished by their remarkable fastness to light, which is at least equal to that of the alizarine dyestuffs. As diazo components the diazotized 3-amido-2-cresol-5-sulphonic acid, the 3-amido-4-cresol-5-sulphonic acid, and the 3-amido-4-cresol-6-sulphonic acid, and as combining components 1-phenyl-3-methyl-5-pyrazolone or its sulpho and carbonic acid derivatives, which are capable of being combined, are used.

YELLOW ACRIDINIUM DYE AND PROCESS OF MAKING  
SAME.

Otto Sohst, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 739,117, dated September 15, 1903.

Dyestuffs of the acridinium series—that is to say, those alkylated at the acridine nitrogen have hitherto only been obtained by the action of an alkyl halide, dimethyl sulphate, or para-toluenesulphonic acid ester on certain amido-acridines—such, for instance, as acridine yellow, benzoflavine, etc. (American patent specifications Nos. 666,095 and 666,096.) By the action of acid and alcohol on amido-acridines, however, alkylated acridine dyestuffs are formed in the amido groups. (English specification No. 8,872 of 1900, lines 40 to 49.) The inventor has now found a process which permits of alkylating simultaneously the acridine nitrogen and the amido groups. (The alkylation of the amido groups occurs in general only partially.) This simultaneous alkylation is effected by heating to a high temperature the diluted aqueous acid solutions of leuco compounds of acridine dyestuffs with alcohol. For the leuco compounds the corresponding methane bases may directly be used; but then the shade of the dyestuff obtained is often somewhat dull.

These dyestuffs are readily soluble in water, dyeing cotton treated with tannin and leather yellow to orange-yellow.

MONOAZO DYE AND PROCESS OF MAKING SAME.

Otto Sohst, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 739,118, dated September 15, 1903.

The inventor claims that the monoazo dyestuff obtained from para-diamidohydroquinonedialkyl ether and chromotropic acid is a technically valuable pure-blue dyestuff for wool. Its

property of dying evenly is good, its fastness to alkali is equal to that of Victoria violet, and at least as good to water and washing.

The dyestuff is of special interest on account of its blue shade, of great importance in the dyeing and printing of wool. No pure greenish-blue dyestuff for wool easily discharged—that is to say, with tin salt—has hitherto been put at the disposal of the dyer or printer. Pure blue and, by adding yellow, green shades could only be obtained on wool in the discharge method of printing by using triphenylmethane dyestuffs, which can be discharged to produce white only with zinc-dust discharges. Their drawback, however, is that they considerably attack the wool fibre when steamed and the zinc-dust enters the grooves of the rollers.

This invention relates to the manufacture of azo dyestuffs, of which that defined above is an example, whereby there can be produced on wool blue and, by adding yellow azo dyestuffs, green shades, which exclusively consist of azo dyestuffs, and consequently are easily discharged with tin-salt discharges.

#### ANTHRACENE DYE.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin and Soda Fabrik. Patent No. 739,145, dated September 15, 1903.

The invention relates to a new yellow coloring-matter which can be obtained from beta-amido-anthraquinone either alone or in admixture with a blue coloring-matter and methods of producing such coloring-matter either alone or mixed with a blue coloring-matter. The blue coloring-matter accompanying the new yellow coloring-matter is the same as the blue coloring-matter described in United States Patent No. 682,523. The chief distinguishing property of this new coloring-matter is that when treated with sodium hydrosulphite and caustic soda it yields a blue solution, which solution is capable of yielding a yellow shade on cotton if the yellow



coloring-matter be unaccompanied by the blue coloring-matter and a green shade if it be accompanied by said blue coloring-matter. For this purpose the cotton is passed through this aforementioned blue solution and is then permitted to remain exposed to the action of the air. The fibre, which at first is of a violet or blue-violet color, finally becomes yellow or green, as the case may be. The shades so produced are distinguished from all other yellow or green dyed fabric by the fact that when treated with a mixture of sodium hydrosulphite and caustic soda they become blue, which blue on subsequent suitable oxidation again becomes yellow or green, as the case may be.

**SUBSTANTIVE BLACK DYE AND PROCESS OF MAKING  
SAME.**

Alcide Francois Poirrier, of Paris, France, assignor to Sté. Ame des Matières Colorantes et Produits Chimiques de St. Denis. Patent No. 740,465, dated October 6, 1903.

The claims cover:

1. The process of making coloring-matters consisting in causing an aromatic sulphur-chloride derivative to react upon an aromatic derivative belonging to the category of substituted diphenylamines, the ratio of amido to hydroxy substitution groups in these diphenylamines being less than two of the former to one of the latter.

2. A coloring-matter, dissolving readily in water, dyeing unmordanted cotton blue-black shades on which energetic oxidating agents, bichromate, etc., have but little action, containing sulphur, having the general constitution which results from reaction of an aromatic sulphur-chloride derivative upon a substituted diphenylamine, and being also distinguished by having a ratio of amido to hydroxy substitution groups of less than two of the former to one of the latter.

## ACRIDINE DYE AND PROCESS OF MAKING SAME.

Christopher Ris and Albert Mylius, of Basle, Switzerland, assignors to Aniline Colour and Extract-Works, formerly John R. Geigy. Patent No. 740,468, dated October 6, 1903.

The present invention relates to the production of basic dyestuffs of the acridine series, especially useful for dyeing cotton or leather mordanted with tannine in orange-yellow, reddish-orange to brown shades, which are to be obtained in a general manner by melting formylated aromatic bases together with a metadiamine and a salt of a base, such as salts of ammonia or of organic bases, the latter serving as agents of condensation.

As formylated bases which may be used for the process are the following: Mono or di formylmetaphenylenediamine, mono or di formylmetatoluylenediamine, formylated alkyl derivatives of these metadiamines, formanilid and its homologues, formyl compounds of monoalkylanilines and of their monologues, formylated naphthylamines, formyl derivates of amidophenol ethers, of paradiamines, and of the bases of the benzidine series. All these compounds furnish when brought into reaction with the same metadiamine compound very similar dyestuffs. The metadiamines which may especially be used are the following: Metaphenylenediamine, metatoluylenediamine, and their alkyl derivatives.

## MORDANT DISAZO DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin & Anilin Farbenfabrik. Patent No. 740,767, dated October 6, 1903.

This invention relates to the manufacture of primary disazo dyes, which may be obtained by combining in an alkaline solution nitro derivatives of the orthodiazo-phenol with the monoazo dyes, resulting by the reaction of diazo compounds

of the benzine series upon 2.5 amidonaphthol-7-sulphonic acid in an acid solution. The constitution of these coloring-matters is represented by the general formula

(1) (2) (6)                      (2) (5) (7) (1)



wherein "X" means H, CH<sub>3</sub>, NO<sub>2</sub>, Cl, SO<sub>3</sub>H, COOH, and "R" a benzine residue.

Coloring-matters of this constitution have been unknown hitherto. These dyestuffs yield on wool when chromium mordants are subsequently added to the dye-bath very valuable shades from reddish black to bluish black and full black, distinguished by a prominent fastness against light, acids, alkalis and milling.

The claims specify the dyestuff obtained from picramic acid, paranitraniline ortho sulphonic acid and 2.5-amido-naphthol-7-sulphonic acid.

#### BLACK MORDANT DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin & Anilin Farbenfabrik. Patent No. 740,768, dated October 6, 1903.

This invention relates to the manufacture of primary disazo dyes, which may be obtained by combining in an alkaline solution nitro-derivatives of the ortho-diazo-phenol with the mono-azo dyes, resulting by the reaction of diazo compounds of the naphthalene series upon 2.5-amidonaphthol-7-sulphonic acid in an acid solution.

The constitution of these coloring-matters is represented by the general formula



wherein "X" means H, CH<sub>3</sub>, NO<sub>2</sub>, Cl, SO<sub>3</sub>H, COOH, and "R" a benzine residue.

Coloring-matters of this constitution have been unknown

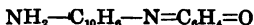
hitherto. It found that these dyestuffs yield on wool when subsequently adding chromium mordants to the dye-bath very valuable shades from reddish black to bluish black and full black, distinguished by a prominent fastness against light, acids, alkalies and milling.

The claim specifies the dyestuff obtained by the action of picramic acid upon the monoazo dye obtained by combining in an acid solution diazotized beta-naphthylamine-3.6-disulphonic acid with 2.5-amidonaphthol-7-sulphonic acid.

#### GREEN SULPHUR DYE AND PROCESS OF MAKING SAME.

Richard Gley, of Berlin, Germany, assignor to Actien-Gesellschaft für Anilin Fabrikation, of Berlin, Germany. Patent No. 741,030, dated October 13, 1903.

The inventors have discovered that the indophenol



which is obtained by joint oxidation of alpha-naphthylamine and para-amidophenol yields a most valuable sulphur dye when heated with alkali polysulphides in the presence of copper salts. The formation of the dyestuff takes place very readily and may practically be carried out by boiling in a concentrated aqueous solution. It is a dark-green powder which is insoluble in water, easily soluble in alkali sulphides with green color, and slightly soluble in caustic alkalies. The dyestuff produces on cotton green shades of remarkable fastness.

#### PROCESS OF MAKING AZO DYES.

Franz Scholl, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 741,552, dated October 13, 1903.

In French Patent No. 316,866 orthoamidophenolazo dyestuffs are described which are derived from 1.8-azimidonaphthalene-4-sulphonic acid and are obtained by treating the corresponding

azo dyestuffs of 1.8-diamidonaphthalene-4-sulphonic acid with nitrous acid. By the present invention some of these dyestuffs may be obtained in a direct but hitherto-unknown manner by combining the 1.8-azimidonaphthalene-4-sulphonic acid with the diazo compound in the presence of a large excess of alkali. Hitherto the azimidonaphthalene sulphonic acid has been considered to be a body incapable of reaction, and has heretofore not been used for the manufacture of azo dyestuffs.

#### BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Richard Herz, of Frankfort-on-the-Main, Germany, assignor to Leopold Cassella & Co. Patent No. 742,189, dated October 27, 1903.

In the United States Patent No. 709,151 is described a process of producing a blue dyestuff from para amidotolyl para oxyphenylamine. The inventor has now discovered that a dyestuff of similar properties, but of a considerably greener shade, is obtained if one atom of chlorine is introduced into the ortho position to the hydroxyl group of the said para amidotolyl para oxyphenylamine. This hitherto unknown para amidotolyl para oxychlorophenylamine may be obtained by reducing the product of simultaneous oxidation of equimolecular proportions of chlor para amidophenol and ortho-toluidine.

The dyestuff is easily soluble in water in presence of sodium sulphide with a blue color, and dyes direct greenish-blue indigo shades on unmordanted cotton, which are fast to washing, acids and light.

#### MONOAZO DYE AND PROCESS OF MAKING SAME.

Richard Gley and Otto Siebert, of Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 743,071, dated November 3, 1903.

This invention relates to the manufacture of an azo dyestuff

which is obtained by combining the diazo compound of the following sulpho-acid:



in which X represents  $NO_2$ , Cl or  $CH_3$ , with beta-oxynaphthoic acid. The coloring-matters thus obtained are most suitable for the preparation of red lakes which are distinguished by their brilliant color and their fastness against the action of water, oil, and light. These lakes therefore are extremely fit for use as printing-lakes in lithography and for similar purposes.

The new azo dyes even in the form of their alkali salts are only slightly soluble in water and may easily be converted into completely insoluble compounds by preparing other metal salts of them.

#### YELLOW DYE AND PROCESS OF MAKING SAME.

Joseph Turner, Huddersfield, England. Patent No. 743,778, dated November 10, 1903.

This invention relates to the manufacture or production of a yellow dyestuff for dyeing fiber or fabrics.

The object of his invention is to produce a new and novel yellow dyestuff capable of dyeing wool, silk and jute in fine greenish-yellow shades which are fast to light.

The inventor has found that meta dinitro diphenylamine para sulphonic acid when nitrated under suitable conditions yields a new yellow dyestuff capable of dyeing wool, silk and jute in fine greenish-yellow shades fast to light.

#### PURPURINE-ALPHA-SULPHONIC ACID.

Karl Thun, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Co., of New York, N. Y. Patent No. 746,405, dated December 8, 1903.

This invention relates to the manufacture of the hitherto unknown purpurine-alpha-sulphonic acid.

The process for producing this acid consists in first treating

anthraquinone-alpha-sulphonic acid with fuming sulphuric acid of a high percentage of SO<sub>3</sub>, and then saponifying the sulphuric ester thus produced in the usual manner by heating it with caustic alkalies or with acids.

It is a red powder which dissolves in hot water, producing a yellowish-red solution. It is soluble in caustic-soda lye, ammonia and a sodium-carbonate solution with a red color and soluble in concentrated sulphuric acid of 66° Baumé with a yellowish-red color which turns violet-red by the addition of boric acid. It dyes alumina-mordanted wool red and chrome-mordanted wool bluish-red shades, which are bluer than the corresponding shades obtained by means of the known purpurine-beta-sulphonic acid.

#### ORANGE TO YELLOW BROWN SULPHUR DYE AND PROCESS OF MAKING SAME.

Edward Culmann, of Buffalo, N. Y., assignor to Schoellkopf, Hartford & Hanna Company, of Buffalo, N. Y. Patent No. 746,926, dated December 15, 1903.

The inventor has found that very valuable dyestuffs can be obtained by heating the sulpho-acids of toluylenediamine—for instance, the acid 1, 2, 6, 4 or the acid 1, 2, 4, 5—or other herein-mentioned sulpho-acids with sulphur and sodium sulphide under certain conditions, thereby producing dyestuffs which dye cotton directly and produce thereon brown shades ranging from yellowish to orange brown. These dyestuffs can be diazotized on the fiber and combined with amins and phenols, whereby the brown shades are deepened or darkened.

The toluylenediaminsulpho-acid can be replaced by the amidotoluyloxaminsulpho-acids described in U. S. patents Nos. 659,496 and 659,497. The dinitro acid corresponding with the toluylenediaminsulpho-acid 1, 2, 6, 4 can be used instead of said acid, whereby a more yellowish-brown shade is produced.

**PROCESS OF MAKING INDOXYL AND DERIVATIVES THEREOF.**

Rudolf Knietzsch and Henry Stalay Arthur Holt, of Ludwigshafen-on-the-Rhine, Germany, assignors to the Badische Anilin und Soda Fabrik. Patent No. 746,965, dated December 15, 1903.

It is known that on heating phenyl-glycin or its homologues at a high temperature with an alkali hydroxide or alkali hydroxides either alone or in admixture with an oxide of an alkali earth, such as quicklime, leuco compounds of the indigo series are formed—namely, indoxyl or derivatives thereof. By employing quicklime alone without caustic alkali either no indoxyl compound or but a small quantity thereof is formed, so that quicklime by itself is useless for the manufacture of indigo by the above process on a large scale.

It is now claimed that by heating phenyl-glycin or a homologue thereof, including derivatives containing alkyl attached to the nitrogen, with an oxide of an alkaline earth of high molecular weight, such as strontium oxide or barium oxide, indoxyl or its homologues can be obtained in considerably better yield than when phenyl-glycin or a homologue thereof is heated with quicklime. The improvement is apparently greater the higher the molecular weight of the oxide used, since better results have hitherto been obtained with barium oxide than with strontium oxide.

The claims specify the use of the barium compound.

**ACRIDINE DYE AND PROCESS OF MAKING SAME.**

Carl Ludwig Müller, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik, of Ludwigshafen-on-the-Rhine, Germany. Patent No. 746,981, dated December 15, 1903.

The inventor has discovered that certain amido-acridine compounds—such, for example, as acridine yellow, benzoflavine and amido-benzoflavine obtained from meta-nitro-benzaldehyde and metatoluylenediamine, as also the hydrochlorides of the leuco



compounds of such compounds—can be converted by heating with glycerine into new coloring-matter. Any suitable proportion of glycerine can be used—for example, an amount equal to or double the weight of the initial material employed—and the whole heated for several hours to a temperature of from, say, 150° to 180° C.

The new coloring-matter dyes cotton mordanted with tannin orange to orange-yellow shades and is especially characterized by the fact that its solution in concentrated sulphuric acid (containing ninety-six per cent. of  $H_2SO_4$ ) becomes on heating at a temperature of 100° C. green, which green color remains after the solution has become cold.

#### BLUE SULPHUR DYESTUFF AND PROCESS OF MAKING SAME.

Niklaus Rongger, of Basle, Switzerland, assignor to Corporation of Chemical Works formerly Sandoz. Patent No. 747,643, dated December 22, 1903.

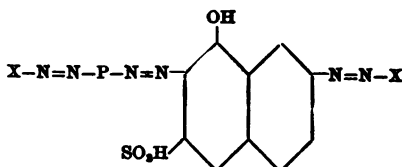
The inventor has discovered that the para-oxypara-amido meta-methyl-diphenylamine described in the U. S. patent No. 709,151 can be transformed in a very valuable blue sulphur dye by simply heating it with sulphur at elevated temperatures varying from 170° to 210° C. A strong current of sulphureted hydrogen is developed in the reaction, and after two hours the entire process is complete. The melt can be used directly for dyeing without any further purification. By adding to the ingredients of the melt a small quantity of chromium hydroxide the shade of the resulting dyestuff becomes a trifle more reddish and brighter, the general properties of the product remaining, however, unaltered.

It dissolves very easily in diluted alkaline sulphides with a blue color in the cold, which is discolored to a slight brown on boiling. The shades produced by it come out of the dye kettle slightly grayish-green and oxidizes on exposure to the air directly to an intense indigo blue fast to alkalis, washing and light.

## TRISAZO DYE.

Adolf Israel and Richard Kothe, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 748,076, dated December 29, 1903.

This invention relates to the production of new and valuable trisazo dyestuffs derived from 1-acetylamido-2-4-diamidobenzine. These new trisazo dyestuffs have the following general formula:



P meaning the radical of a paradiamine—such as of para-phenylenediamine, para-diamidodiphenylamine, benzidine, tolidine, dianisidine or the like—X meaning the radical of 1-acetylamido-2-4-diamidobenzine, which can be once replaced by a base capable of combining with diazo compounds, for example, meta-phenylenediamine, chloro-meta-phenylenediamine, meta-toluylenediamine, 2,4-diamidoanisole, alpha-naphthylamine, or the like.

The new process for preparing these dyestuffs consists in combining the tetrazotized azo dyestuffs derived from a paradiamine and one molecule of gamma-amidonaphthol sulphonic acid either with two molecules of 1-acetylamido-2-4-diamidobenzine, or at first with one molecule of this body and then with one molecule of one of the bases, or at first with one molecule of one of these bases and then with one molecule of 1-acetylamido-2-4-diamidobenzine.

These dyestuffs are dark powders, which dissolve in water with a bluish-black color. They dye unmordanted cotton from brownish-black to bluish-black to black shades.

BLUE ANTHRAQUINONE DYE AND PROCESS OF MAKING  
SAME.

Eduard Hepp, of Frankfort-on-the-Main, and Christoph Hartmann, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 748,375, dated December 29, 1903.

It is shown in U. S. Patent No. 734,866 that by nitrating the anthraquinone-ortho-sulpho-acid and then reducing the products thus obtained two amidoanthraquinone sulpho-acids are produced, which were proved to be 1.5 and 1.8 derivatives.

The inventors have found that the corresponding 1.5 and 1.8 amidoöxyanthraquinones, which may be prepared by heating the 1.5 and 1.8 amidoanthraquinone sulpho-acids with alkalies or alkaline earths, can be easily transformed into very valuable coloring-matters. In order to obtain these coloring-matters, the amidoöxyanthraquinones are treated with halogens, such as bromine. The new halogen derivatives thus obtained are condensed with aromatic amines—such as aniline, ortho or para toluidine, xyloidine, or the like—and, finally, the resulting condensation products are transformed into dyestuff sulphonic acids by the action of sulphonating agents. The new coloring-matters thus obtained dye chrome mordanted or unmordanted wool fast-blue shades.

The claims specify the dyestuff obtained from 1.5 amidoöxyanthraquinone and aniline.



## II.—PROCESSES OF APPLICATION.

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### PROCESS OF DYEING.

Oscar Jaeck, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co. Patent No. 717,749, dated January 6, 1903.

The inventor describes a process of after-treatment for sulphur colors, consisting in treating the goods dyed with sulphurized dyestuffs with neutral sulphites, after which treatment it is suitable to expose them to the influence of the air. The results are remarkable, especially when using those dyestuffs which, by the known process of after-treatment, give a still more valuable shade—such, for instance, as immedial blue C R, katigen-indigo B extra and R extra, immedial black V extra, katigen blue-black R, or the like. The action of the sulphites takes place with great facility. It is generally completed in a short time on working at a temperature of from 60° to 80° centigrade. The resulting shades are mostly distinguished for great brightness and fastness. They have generally a certain resemblance to the shades obtained by steaming the dyed cotton in the presence of alkalies. The low price of the sulphites and the simple management are of great technical value for the new process of after-treatment.

### PROCESS OF DYEING RAW STOCK.

William J. McConville, of Lawrence, Mass. Patent No. 718,651, dated January 20, 1903.

The object of this invention is to avoid uneven dyeing of the raw stock caused by contact of the fresh dye liquor with some portions of the stock and not with others, resulting from the admission of the fresh dye liquor into the vat. For this

purpose provision is made for mixing the fresh coloring-matter or dye liquor with the weaker liquor extraneous to the main vat, and preferably effecting this result by connecting the liquor-supply tank or vessel with a circulating pump at its suction side, so that the fresh liquor, in predetermined quantities, may be thoroughly admixed with the weaker liquor drawn from the dye vat and the resultant liquor of the desired or required strength brought into contact with the raw stock in the auxiliary vessel or basin, in which the said stock is thoroughly saturated with the dye liquor, thus insuring the raw stock being dyed uniformly, which is especially advantageous in light shades.

#### INCREASING THE FASTNESS OF INDIGO DYEINGS.

Armand Julius Stiegelmann, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 720,501, dated February 10, 1903.

Indigo dyeings on vegetable fibre (whether produced by natural indigo or by artificial indigo) are not so fast against the action of chlorine and washing as is desirable.

According to this invention the dyeings are treated with Turkey-red oil, either alone or in conjunction with aluminum salts, in a manner, for instance, similar to that practiced in Turkey-red dyeing. The treatment can be performed once or several times, the material being dried between each treatment. A subsequent short steaming further increases the fastness of the dyeings. The treatment, according to this invention, is applicable to dyeings with either natural indigo or artificial indigo.

By this means indigo dyeings on vegetable fibres are rendered so fast against washing and the action of chlorine as to fulfill all ordinary requirements of the trade as regards such fastness.

### PROCESS OF GIVING LISLE-THREAD FINISH TO VEGETABLE FABRICS.

Alexander N. Dubois, of Philadelphia, Pennsylvania. Patent No. 723,147, dated March 17, 1903.

This invention relates to a method of removing from goods made from vegetable fibre, particularly cotton goods, the filamental fuzz which is apt to occur and giving such goods the smooth lustre and finish of what is known as "lisle thread."

The method consists in saturating the goods to be treated with a chemical or mixture of chemicals having the property of changing the physical condition of cellulose fibre, then removing the fluid by mechanical means, such as a hydro-extractor, and then subjecting the goods to a drying action until the chemical impregnating them acts upon and changes the character of the fuzz, subjecting them at the same time to an energetic attrition, which breaks off the brittle fibre and imparts the lisle-thread lustre and finish to the goods. The active chemicals must then be neutralized or removed from the goods to prevent them from further acting on the body of the fabric.

### PROCESS OF DYEING WITH SULPHUR DYES.

Ernst Voetter, of Uerdingen, Germany. Patent No. 724,631, dated April 7, 1903.

Great difficulties are experienced in the application of the majority of sulphur dyes in the dyeing process upon the jigger. The goods show discolored edges, presumably caused by the oxidizing action of the air and by the drying of the edges, as well as by the high temperature. Experiments made with a view of obviating this difficulty have shown that the inconvenience may be overcome in a most simple manner by pouring cold water continuously upon the edges of the unwinding roll of goods, so as to keep these edges constantly wet

and to decrease the high temperature. It is, however, essential that the liquid be kept cold and the admission of water is not interrupted, the water being admitted, preferably, by means of a spray connected to a water-conduit. In order to arrive at a better distribution of the water, a roller coated with an elastic covering and being so arranged as to cause a slight pressure upon the edges may be mounted beneath the spray. Instead of water may be used cold dyeing liquor, which may be suitably diluted with water, with or without addition of sulphide of soda, or a solution of the dyestuff or a solution of sulphide of soda.

#### PROCESS OF PRODUCING PERFORATED OR OPEN-WORK PATTERNS IN FABRICS.

Carlos Casanovas y Amat, of Barcelona, Spain. Patent No. 725,823, dated April 21, 1903.

The present invention relates to an improved process for the production of perforated fabrics by means of substances which chemically destroy the fabric at the parts where they come into contact with the latter, the substances being applied to the fabric by mechanical means or by hand.

This local destruction of the fibres of the fabric is obtained in a very great number of cases by the carbonization of the fibres by treating them with or by applying to them by means of stamps an acid or an acid salt in the case of vegetable fibre or an alkali or an alkaline salt in the case of animal fibre. In fabric made of both vegetable and animal fibre the destruction of both kinds of fibre can be easily effected by stamping the design in acids or acid salts and alkalies or alkaline salts. The stamping can be effected by hand by means of suitable dies, patterns, or stencils, or mechanically by any suitable system. After the stamping the fabric may be subjected to a high temperature in order to further the carbonization or destruction of the fibre either by applying hot surfaces or by



means of steam, or by any other suitable means. The fabric is then printed, if desired, in colors.

#### PROCESS OF DYEING.

Myrtill Kahn, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 725,847, dated April 21, 1903.

The claim covers the process for producing on wool fast-black shades, which process consists in first dyeing wool from acid-bath with dyestuffs obtainable by combination of the diazo derivatives of o-amidophenol derivatives with 1.5 dioxynaphthalene and then treating the dyed goods with chromium compounds reacting as oxidizing agents.

#### PROCESS OF DYEING AND PRINTING IN ANILINE-BLACK.

Friedrich Cleff, of Rauenthal, near Barmen-Rittershausen, Germany. Patent No. 727,292, dated May 5, 1903.

This invention relates to improvements in dyeing and printing in aniline or true black. In such arts an oxidizing process is employed consisting in impregnating the fibres with a bath of a solution of an aniline salt, chiefly aniline hydrochlorate, with oxidizing agents—such as nitrate of copper, chlorate of soda or of potash—drying, steaming and chroming. In this treatment the fibres are, however, much weakened by the mineral acids which are liberated in the steaming, and the shade of the black color thus obtained is so far alterable that it easily passes into green—that is, the black soon acquires a green cast.

The inventor finds the above-mentioned defects can be overcome by using formic acid ( $\text{CH}_3\text{O}_2$ ) or salts thereof in the dyeing and printing process. By using formic acid the need for mineral acids is avoided, since formic acid acts quickly and

powerfully. It does not weaken the fibres. The black obtained by its use is intense and free from greenish cast, while the fabric acted on has a beautiful touch and brilliancy.

#### PROCESS OF MORDANTING WOOL, ETC.

Hermann Schrader, of Hönningen, Germany. Patent No. 735,599, dated August 4, 1903.

The inventor has found that the fixation of the metallic mordants may be effected in a very excellent manner by treating the wool with metallic mordants and the organic acids that may be obtained from the vinasse in the following manner: The vinasse—i. e., the residual liquor remaining in the molasses of beet-root, etc., by separating the sugar by fermentation or desaccharifying with barium oxide, strontium oxide, or calcium oxide—is concentrated to a specific weight of 1.4. It is mixed in a warm condition with the quantity of sulphuric acid necessary for neutralizing the alkalinity. The sulphate of potassium formed by this treatment is separated from the liquid by cooling, crystallizing, etc. The sulphuric acid, present in the liquid as in a combined as in a free state, is precipitated by a suitable barium compound; for instance, carbonate of barium. The liquor separated from the sulphate contains the organic acids of the vinasse. The claims cover the use of these acids in the process of mordanting.

#### PROCESS OF DYEING BROWN.

Emile A. Fourneaux, of New York, N. Y., assignor to Herman A. Metz, of New York, N. Y. Patent No. 739,071, dated September 15, 1903.

The production of brown shades on cotton fabrics by the oxidation of aromatic bases in itself is well known. Such browns were produced soon after the discovery of aniline-black by the oxidation of certain naphthylamine compounds; but their use has been discontinued long since, because the shades no longer answered the requirements of the trade.

Mention has also been made in the literature of dyeing of certain bases—like, for instance, benzidine—giving browns by similar oxidation; but these bases have never been used in the arts, because the shades obtained were of no practical value.

The inventor has discovered that by oxidizing on the fibre certain aromatic metadiamino compounds, more especially those derived from benzine and its homologues, under suitable conditions beautiful brown shades of great fastness can be produced very simply and economically. The most suitable oxidizing agent for the purpose consists in metallic chlorates in the presence of copper, cerium, or other of the well-known salts capable of transferring oxygen by catalytic action. Aluminum chlorate gives the best results. The presence of a certain amount of a mineral acid in the form of the corresponding salt of the base is necessary. The amounts of mineral acid and of the oxidizing agent must be carefully gauged, as an excess of either leads to partial destruction of the dye. Certain organic acids, especially oxalic acid, can be used; but the results are not quite as good as when mineral acids are used.

The process of oxidizing aromatic metadiamino compounds gives strong and bright shades of brown, which possess the desirable cast of the well-known manganese-bronze and which can be produced by this process in a simpler and cheaper manner than it has been possible to produce them before. These brown shades can also be resisted, both in printing and dyeing, by reducing and by alkaline substances, the most suitable resist being a concentrated solution of neutral potassium sulphite suitably thickened and mixed with an alkali, alkaline salt, or a metallic oxide, preferably oxide of zinc. This is preferably printed on the fabric before the brown shade is developed thereon.

The invention consists in producing a fast-brown shade on cotton and on silk fabrics by oxidizing on or in the fibre an aromatic metadiamino compound, and more especially one belonging to the benzine series—metaphenylenediamine, its

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homologues, or its products of substitution. This constitutes a marked improvement in the art of printing on and dyeing of cotton fabrics.

### PROCESS OF TREATING YARNS, ETC., WITH VOLATILE LIQUIDS.

John Edward Prestwich, of Farnworth, England. Patent No. 740,778, dated October 6, 1903.

This invention relates to the treatment of textile yarns and threads by volatile liquids—as, for example, in spirit dyeing, in degreasing, in charging the yarn or thread with water-proofing compounds dissolved in benzine or in other similar operations.

The claim covers the process for treating textile yarns and threads, which consists in spreading the yarn or thread in an open condition so as to form a cylindrical sheet, upon an open revolvable reel contained in a closed vessel, in introducing into the closed vessel a volatile solvent and rotating the reel therein, in thereafter withdrawing the liquid solvent, then applying heat to the closed vessel, and rotating the reel at a high speed, and finally arresting the movement of the reel and applying a cooling agent to the still closed vessel so as to liquefy the solvent vapors before the vessel is reopened.

### PROCESS OF DISCHARGING WITH HYDROSULPHITE PASTE.

Leopold Heinrich Dehoff, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin & Soda Fabrik. Patent No. 744,501, dated November 17, 1903.

This improvement in the art of discharging dyed goods by means of sodium or another hydrosulphite and according to which improvement the presence of metallic zinc or other free or uncombined metal is completely avoided is based upon

the discovery that such concentrated solutions of the alkali hydrosulphites as can be obtained when working according to the process which is described in German Patent No. 112,483 for the production of the solution of hydrosulphites, or the new solid sodium hydrosulphite whose preparation is likewise described in said German Patent No. 112,483, dated May 24, 1899, and issued August 1, 1900, or the zinc-sodium hydrosulphite which is the subject of United States Patent No. 662,339, of November 20, 1900, or the zinc-calcium hydrosulphite which is the subject of United States Patent No. 662,338, of November 20, 1900, are capable of use in a discharge-paste as are other discharging agents. Since discharge-pastes so prepared are free from metallic zinc, the above-mentioned drawbacks and disadvantages do not exist when such pastes are employed for discharging purposes. Hitherto no solution of a hydrosulphite carrying no metallic zinc or a solid product containing a hydrosulphite appears to have been successfully used, if at all, in substance to prepare a discharge paste.

#### PROCESS OF PRINTING SULPHUR DYESTUFFS.

Edmond Bourcart, of Mülhausen, Germany, assignor to the firm of "Fabriques des Produits Chimiques de Thann et de Mülhouse." Patent No. 747,295, dated December 15, 1903.

The following process is described by this patent:

The commercial coloring-matter is precipitated from its solution in alkaline sulphide by means of an acid, and the precipitate is washed until the acid reaction has disappeared. It contains then more or less of free sulphur. This precipitate, as it is or after spontaneous oxidation, mixed with a thickening, a certain amount of an alkaline carbonate (neutral carbonate or bicarbonate), and at least one reducing agent—as, for instance, sodium thiosulphate, sulphite, formiate or xanthate, sulphur, glucose, etc.—is ready for printing, and does no more attack the copper rollers.

The sulphur and the other reducing agents act only when

the cloth is steamed. Therefore the printing-color is stable and may be kept for a certain time, whereas the color reduced before printing oxidizes itself rapidly in the presence of air, a fact which contributes to make disadvantageous the processes known hitherto. The alkaline carbonate or bicarbonate and the free sulphur yield on steaming alkaline sulphide, which serves to fix the coloring-matter, and in presence of a reducing agent this fixation is more rapid. The patterns printed in this way resist completely to washing and soaping without staining the white ground.

#### PROCESS OF DYEING TEXTILE FIBRE BLUE.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 746,784, dated December 15, 1903.

In U. S. Patent No. 682,523 it is shown that by melting beta-amido-anthraquinone with caustic alkali—for instance, caustic potash—under the conditions therein set forth and oxidizing the leuco body obtained with air a new coloring-matter can be obtained, with the properties there given, which coloring-matter is known in trade literature and commerce as "indanthrene."

The present patent covers the production of blue shades on or within textile fibre by converting the said coloring-matter into its soluble form by treating it with suitable reducing agents—such as sodium hydrosulphite and caustic soda, zinc-dust and caustic lime, or any other equivalent method—thus producing a vat, and dyeing the said fibre in the said vat. The shades thus produced are of great brilliancy and excellent fastness and resemble to some extent those produced by ordinary indigo. They are, however, brighter than these.

### III.—CHEMICAL PROCESSES.

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#### PROCESS OF MAKING CYAN-METHYL DERIVATIVES OF AROMATIC AMIDES.

Otto J. Graul, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 718,340, dated January 13, 1903.

This invention relates to a new process for the production of omega-cyan-methyl derivatives of certain aromatic amines or substitution products of these latter.

By the action of formic aldehyde upon certain aromatic amines or aromatic amido substances the corresponding anhydro-formaldehyde-aromatic-amido substance is formed. Thus formic aldehyde and aniline yield anhydro-formaldehyde-aniline. These anhydro-formaldehyde-aromatic-amido substances when treated with an alkali bisulphite, such as sodium bisulphite, yield products which are termed, for instance, in the case of aniline, "anhydro-formaldehyde-aniline-sodium-bisulphite," and generally termed "anhydro-formaldehyde - aromatic - amido - substance-alkali-bisulphite." Now it is found that if certain such bisulphite compounds be acted upon by a salt of hydrocyanic acid, such as potassium cyanide or sodium cyanide, the above-mentioned omega-cyan-methyl derivatives are produced.

Among the aromatic amido substances which can be employed in carrying out this invention are aniline, the toluidines, the xyliidines, the naphthylamines and anthranilic acid (ortho-carboxy-aniline).

## PROCESS OF PURIFYING FATS.

Isidor Klimont, of Vienna, Austria-Hungary, assignor to Emanuel Khuner & Sohn. Patent No. 719,014, dated January 27, 1903.

This invention relates to the purification of animal or vegetable fats, and has for its object an improved process for removing from such fats all substances which may cause their rancidity, which are generally albuminous substances or sebacic acid salts. For removing the sebacic-acid salts from the fat the latter is treated with such alkaline-earth compounds as are completely or partly soluble in water—as, for instance, hydroxide of calcium, chloride of calcium, and such like—whereby sebacic-acid salts insoluble in water are precipitated, while the clear oil may be filtered off. For removing the albuminous substances the fat or oil to be treated is kept for some time in a vessel at a temperature above 100° centigrade, which causes the albuminous substances to precipitate.

## METHOD OF MAKING SULPHURIC ANHYDRIDE.

John B. Francis Herreshoff, of Brooklyn, New York. Patent No. 719,332, dated January 27, 1903.

This invention relates to the manufacture of sulphuric anhydride according to the so-called "contact" process, in which a mixture of air and sulphurous-acid gas is caused to come in contact with catalytic substances, such as finely-divided platinum or equivalent bodies. To overcome this defect of dissociation which under the usual conditions may occur, the inventor proceeds by successive stages, and employs at least two contact-chambers, through which the gas is caused to pass in succession. In its path from one contact-chamber to the other the gas is caused to traverse a heat-exchange apparatus or cooler, in which the heated gas gives off part of its heat to the incoming gas which is on its way to the first contact chamber. A similar heat-exchange apparatus is connected with the outlet to the last contact-chamber,



and this apparatus is connected in series, as it were, with the other cooler, so that the arriving cool gas mixture may be subjected to two or more successive heatings.

#### PROCESS OF MAKING DECOLORIZED TANNIN EXTRACTS.

Georg Klenk, of Hamburg, Germany. Patent No. 720,157, dated February 10, 1903.

The present invention chiefly consists in treating the crude tannin extracts or tannin solutions at boiling temperature with alumina sulphate, and subsequently with sodium bisulphite. During this treatment the alumina sulphate has at first an intense decolorizing effect, after which it interacts with the bisulphite in the manner represented by the following equation:



The alumina hydrate in a nascent state produced in this manner attracts the separated particles held in suspension and falls to the bottom, thereby clarifying and decolorizing the liquid. The sulphurous acid also obtained in a nascent state has a decolorizing effect and escapes almost completely during the concentration or boiling down of the liquor. The complete separation of the alumina out of the liquid is absolutely necessary, because otherwise extracts would be obtained which are decolorized, but which lack the easy and clear solubility in cold water which are necessary. For completely separating the alumina a slight excess of bisulphite is required, which renders the extract limpid and easily soluble. Extracts produced in this manner are soluble in cold water. They possess and retain a decidedly-acid reaction and impart to the leather a fine light yellow color, differing but slightly or not at all from that which is produced by oak tanning.

## PROCESS OF PRODUCING CASEIN.

Aubrey D. Charles, of Bellows Falls, Vermont, assignor to Casein Company of America. Patent No. 721,999, dated March 3, 1903.

This invention has for its object to provide a product of casein which has been precipitated by muriatic acid, but from which thin casein solutions may be produced.

In the new process the curd is precipitated from the milk with the smallest amount of muriatic acid possible and with the milk preferably at a temperature of about 120° Fahrenheit. After the precipitation is complete the whey is drained off and the curd is washed with water, preferably heated to from 130° to 140° Fahrenheit, and containing a small percentage of sulphuric acid. The amount of acidulated water introduced into the vat should be sufficient to cover all of the wet curd, and the proportion of sulphuric acid in this wash-water will be about twenty-two ounces to about one thousand gallons or so of water. The curd is then worked in this solution until it is in condition to be pressed. The addition of the sulphuric acid to the wash-water has a very pronounced effect upon the curd, changing its character, so that the surplus water may be readily pressed out of the curd by placing the same between cloths, which is very difficult or impossible with muriatic-acid-precipitated curd that has not been subjected to this dilute-sulphuric-acid treatment. It has been discovered that the muriatic-acid-precipitated casein which has been subjected to this dilute-sulphuric-acid treatment makes a solution which is essentially the same as a casein solution made from sulphuric-acid-precipitated curd, in that thin solutions of the muriatic-acid-precipitated curd which have been subjected to the dilute-sulphuric-acid treatment are obtained with a comparatively small amount of water with the alkali used for the solutions.

## PROCESS OF MAKING SULPHURIC ACID.

John B. F. Herreshoff, of New York, N. Y., assignor to General Chemical Company, of New York, N. Y. Patent No. 722,981, dated March 17, 1903.

It has been customary for a long time to absorb the sulphuric anhydride, or rather gases containing sulphuric anhydride, in sulphuric acid of relatively low concentration, so that the strength of the acid was increased by the absorption of the anhydride, and thus sulphuric acid of the desired strength was finally produced. The inventor has found that the absorption of the sulphuric anhydride takes place much more quickly and that the process yields a much better product if the sulphuric acid used for absorbing the anhydride is from the very beginning of the operation of about the same strength which is intended to be the final strength of the finished product. In other words, if it is desired to produce acid of ninety-seven or ninety-eight per cent., not, as heretofore, to start with acid of lower strength, but fill the absorber from the beginning with sulphuric acid of ninety-seven or ninety-eight per cent. and lead the mixture containing the sulphuric anhydride into this strong acid. Of course in order to preserve this degree of concentration it is necessary to counteract the tendency of the sulphuric anhydride to increase the strength of the acid, and this is done by continuously adding in the proper proportion to the anhydride admitted a diluting agent, which might be steam, water, or relatively weak sulphuric acid. The purpose of this step is to continuously maintain the sulphuric acid at the same degree of concentration, so that the absorption of the anhydride takes place under unvarying conditions, thus securing a very efficient, economical and uniform procedure.

## PROCESS OF MAKING SULPHURIC ANHYDRIDE.

William C. Ferguson, of Flushing, New York, assignor to General Chemical Company, of New York, N. Y. Patent No. 723,596, dated March 24, 1903.

This invention relates to the manufacture of sulphuric anhydride according to the contact process, and has for its object to reliably regulate the temperature of the gaseous mixture, and consequently of the contact-chambers, and to gradually dilute the gaseous mixture so as to obtain a high efficiency in the output.

#### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 724,235, dated March 31, 1903.

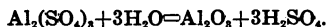
The composition in the present instance consists of an intimate mixture of precipitated zinc hydrate (or oxide) and barium sulphate, preferably in molecular proportions, and while a compound precipitate of zinc hydrate and barium sulphate is not new, the process is novel. Broadly stated, the process contemplates the successive precipitation of zinc hydrate and barium sulphate from solutions of zinc sulphate and soluble barium salts, notably the sulphide (chloride, acetate, or nitrate), the zinc hydrate being first precipitated by means of a hydrate of one of the alkali metals, preferably sodium hydrate.

#### PROCESS OF PRODUCING SULPHURIC ACID AND METALLIC OXIDES.

Henry Spencer Blackmore, of Mount Vernon, New York. Patent No. 724,251, dated March 31, 1903.

This process consists in introducing the aluminium sulphate into a retort or container and preferably warm the same slightly—about 212° Fahrenheit—for the purpose of dehydrating the mass and making it porous and easily permeable by fluid reagents. Then introduce into the container highly-superheated steam (HO). The latent or occluded heat of the steam induces a reaction between the aluminium sulphate and the steam, resulting in the production of aluminium oxid and

sulphuric acid, which latter is carried out of the apparatus by the excess or current of undecomposed steam and finally condensed. The reaction which takes place may be illustrated by the following chemical formula or equation:



It can be readily seen that, the reaction taking place in the body or presence of heated steam, dissociation of the sulphate is avoided and a definite reaction assured, thus entirely preventing dissociation into sulphur dioxide and free oxygen. The dry superheated steam thoroughly permeates the porous mass and also reacts throughout the mass, so that the aluminium oxide produced is not contaminated with acid to an injurious degree.

#### PROCESS OF OBTAINING ALUMINA.

Charles A. Doremus, of New York, N. Y. Patent No. 725,683, dated April 21, 1903.

According to this invention aluminium fluoride is prepared from clay, kaoline, bauxite, or other suitable aluminous materials and in acid containing fluorine, which may be hydrofluoric acid or hydrofluorsilicic acid, and usually it is made porous. It is then placed in a retort and subjected to the action of superheated steam. The reaction begins promptly, hydrofluoric acid is evolved, and by an attachment of the retort is conducted to a leaden condenser and is there condensed. The residue remains in the retort after the evolution of the acid is complete, and is alumina.

#### PROCESS OF UTILIZING SULPHITE DYES.

Viggo Drewsen, of New York, N. Y., and Lauritz J. Dorenfeldt, of Trondhjem, Norway. Patent No. 726,036, dated April 21, 1903.

This invention relates to certain improvements in the process

of utilizing sulphite lyes, for which Letters Patent were granted on March 7, 1899, No. 620,755, said improvements being designed with a view of simplifying and cheapening the process and adapting the same for use in sulphite-pulp mills, which are run in connection with and in proximity to soda-pulp mills.

The claim covers the process of utilizing the waste liquors of sulphite and soda pulp mills, which consists in neutralizing the sulphite-mill liquor containing salts of organic sulphonic acids with the liquor from the soda-pulp mill containing sodium sulphide, concentrating the neutralized liquor, calcining the concentrated liquor, leaching the residuum obtained thereby, treating the solution thus obtained with burnt lime, and draining off the soluble sodium salts for further use.

#### PROCESS OF MAKING SULPHURIC ANHYDRIDE.

Max le Blanc, of Carlsruhe, and Constantin Krauss, of Höchst-on-the-Main, Germany, assignors to Farbwerke, Vorm. Meister, Lucius & Brüning, of Höchst-on-the-Main, Germany. Patent No. 726,076, dated April 21, 1903.

This patent describes the process of obtaining  $\text{SO}_2$  from gases containing approximately seven per cent. of  $\text{SO}_2$  and nine per cent. of O by means of the contact method. This consists in conducting the gas mixture through a first portion of contact substance at a temperature of approximately  $500^\circ$  centigrade and of approximately one hundred and twenty liters of pyrites-burner gases per kilo platinum-asbestos, and then directly conducting the resulting gas mixture at the same speed through a second portion of contact substance at a temperature of approximately  $400^\circ$  centigrade.

#### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 726,239, dated April 28, 1903.

This invention has relation to improvements in processes of making pigments; and it consists in the novel series of steps

more fully set forth in the specification and pointed out in the claims.

The composition in the present instance consists of an intimate mixture in molecular proportions of precipitated zinc hydrate (or oxide) and barium sulphate, and while a molecular compound precipitate of zinc hydrate and barium sulphate is not new, the process and the mechanical mixture of separately-precipitated zinc hydrate and barium sulphate are new. Broadly stated, the process contemplates the successive precipitation of zinc hydrate and barium sulphate from solutions of zinc salts (other than sulphate)—notably the chloride, acetate, or nitrate—and soluble barium salts—notably the chloride, acetate, or nitrate—the solution from which either precipitate is derived being formed either in the intermediate steps of the process or being an initial solution with which the process is started, and whether the solution is an initial one or an intermediate one it always serves as a reagent for purposes of precipitation by the addition thereto of the proper solution or salt capable of forming the precipitate at the moment of such addition.

#### PROCESS OF MANUFACTURING MURIATIC ACID.

George E. Hipp, of Buffalo, New York.—Letters Patent No. 726,533, dated April 28, 1903.

This invention relates to a process of manufacturing muriatic acid by compounding niter cake (sodium bisulphate) in dissolved form and a sulphide of an alkali metal, then boiling, clarifying and concentrating the compound, then adding salt, thoroughly blending the entire mass, and finally calcining the same, which produces muriatic acid gas and salt cake—a by-product—free from arsenic, selenium, lead and insoluble matter.

The objects of this invention are to render the process of manufacturing muriatic acid, and salt cake—a by-product—more economical, cheaper, and more expeditious than has

heretofore been possible, to extract all arsenic and selenium (which are very injurious) from muriatic acid, and also from the salt cake, with the additional extraction of lead from the latter.

#### METHOD OF MAKING SULPHURIC ACID.

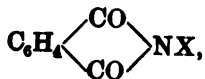
Max Neumann, of Hamborn, Germany, assignor to Franz Meyer, of Hamborn, Germany. Patent No. 729,643, dated June 2, 1903.

The purpose of the present invention is to provide a succession of hot and cold zones separated in time and space from each other aside from the ordinary single Glover tower heretofore employed, and especially to employ a number of Glover towers in the general operation, so that the extraordinarily complete and effective Glover process may be made available to as great an extent as possible in the production of sulphuric acid.

#### PROCESS OF MAKING SUBSTITUTION PRODUCTS OF AROMATIC AMINES.

Rudolf Lesser, of Berlin, Germany. Patent No. 729,876, dated June 2, 1903.

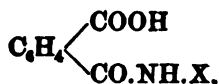
The object of this invention is to provide a method whereby it is possible to obtain nitro and halogen substitution products of those aromatic amines which form condensation products with phthalic anhydride, the condensation products themselves being recovered. Thus aromatic bases of negative substitution are obtained, in the first place, by introducing the halogen or nitro group into the corresponding phthalimides of the type



in which X represents an aromatic radical, and by decomposing the compounds thus obtained with the primary or other



amines; secondly, by introducing the halogen or nitro group into the corresponding phthalamine acids of the type



in which X indicates the same aromatic radical, and by decomposing the compounds, as in the previous example; thirdly, by introducing the halogen or nitro group into the phthalamides mentioned under I and converting the substitution products thus obtained by heat with an equivalent quantity of caustic alkali into the phthalamine acids named under II, which are split in the manner indicated.

#### PROCESS OF TREATING WOOL WASHING SUDS.

Charles Shepherd, of Providence, Rhode Island. Patent No. 730,305, dated June 9, 1903.

The claims cover:

1. That improvement in the art of treating wool-suds which consists in adding a deodorizing agent to the suds, and subsequently treating the deodorized suds with permanganate of potash to facilitate separation of its ingredients, quicken the subsequent filtration and cause a maximum yield of purified grease.
2. That improvement in the art of treating wool-suds which consists in adding a deodorizing agent to the suds without permitting decomposition of the suds, and subsequently treating the deodorized suds with chloride of lime and permanganate of potash to facilitate separation of its ingredients and further purify and deodorize the same.
3. That improvement in the art of treating wool-suds which consists in adding a deodorizing agent to the suds without permitting decomposition or putrefaction of the suds, and then treating the suds with chloride of lime, permanganate of potash, and muriatic acid.

### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 731,152, dated June 16, 1903.

The composition formed by this process consists of an intimate mixture of precipitated zinc hydrate, barium sulphate and barium carbonate, the zinc and barium precipitates being formed either consecutively or simultaneously, according to the character of the soluble barium salt used as reagent. The present process consists in the formation of the precipitates aforesaid from solutions of zinc sulphate (or a mixture of zinc sulphate and zinc chloride), the hydrate of an alkali metal, barium salts, and the carbonates of the alkali metals.

### PROCESS OF MAKING LITHOPHONE AND GLAUBER SALT.

William D. Gilman, of Baltimore, Maryland. Patent No. 732,732, dated July 7, 1903.

This process is the following: To a solution of niter-cake of proper strength in water is added an excess of zinc, either in the form of zinc skimmings, spelter, or acid-soluble zinc ore. This solution is then digested with steam heat until the acid of the niter-cake is neutralized. It is allowed to settle and run through another tank, chloride of lime and milk of lime being added to precipitate the iron, alumina, etc., or this may be accomplished by any other convenient method. The resulting solution is allowed to settle or run through a filter-press into another tank. Next is run in a proper proportion of solution of barium sulphide—i. e., just sufficient to precipitate the zinc of the zinc sulphate as zinc sulphide. Lithophone is precipitated and Glauber salt remains in solution. The precipitate is separated and washed by the usual filter-press method. The mother-liquor left after the precipitation of the lithophone is concentrated to a proper crystallizing strength and allowed to crystallize in tanks, Glauber salt being obtained.

PROCESS OF MANUFACTURING HYDRATE OF CALCIUM  
PEROXIDE.

George Francois Jaubert, of Paris, France. Patent No. 733,047, dated July 7, 1903.

This invention relates to the manufacture of hydrates of the alkaline-earth and other dioxides and in their application to bleaching.

The inventor has discovered that hydrates of sodium dioxide may be advantageously employed in the preparation by a double decomposition of the hydrates of the alkaline-earth and other dioxides. What is meant by "hydrate of dioxide of sodium" is the bodies corresponding to the formula  $\text{Na}_2\text{O}_2 + 2$  to  $10\text{H}_2\text{O}$ .

PROCESS OF MANUFACTURING BROMINE.

Herbert H. Dow, of Midland, Michigan. Patent No. 733,466, dated July 14, 1903.

This invention consists in an improved process for more completely extracting bromine from natural bromide brines and the production of a bromide more nearly free from chlorine. It is an improvement in one of the steps covered in the process of manufacturing bromine by the general process explained and claimed in the U. S. Patent No. 714,160.

PROCESS OF MANUFACTURING BROMIDES FROM  
BROMINE-CONTAINING SOLUTIONS.

Herbert H. Dow, of Midland, Michigan. Patent No. 733,467, dated July 14, 1903.

This invention consists in an improved process for manufacturing bromides from bromine-containing solutions, such as natural brines or artificial solutions of the bromide, and is especially adapted for the manufacture of ammonium bromide.

### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 733,612, dated July 14, 1903.

This invention has relation to improvements in processes of making pigments.

Broadly stated, the process contemplates the successive or simultaneous precipitation of zinc hydrate and barium sulphate from solutions of zinc, barium hydrate, and the sulphate of preferably an alkali metal.

As a general illustration of the process aqueous solutions of barium hydrate, zinc nitrate, and sodium sulphate are prepared. The barium hydrate and zinc nitrate are brought together, when zinc hydrate is precipitated and barium nitrate is formed in solution. To the latter is added the sodium sulphate, when barium sulphate is precipitated and sodium nitrate formed in solution.

Without departing from the principle of the invention other salts of zinc, such as chloride, acetate, and, under certain restrictions, the sulphate may be used. So, too, the sulphate of any of the alkali metals or aluminium sulphate in lieu of the sodium sulphate may be used to effect the precipitation of the barium sulphate.

### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 734,391, dated July 21, 1903.

The present invention contemplates the precipitation of zinc hydrate from solutions of zinc salts and a hydrate of an alkali metal and the precipitation of barium carbonate from solutions of a barium salt and a carbonate of an alkali metal, recovering the precipitates, washing the same, then thoroughly mixing the same, drying, and finally, if desirable, calcining the zinc hydrate into zinc oxide.

As an illustration of the general principle here enunciated, prepare one molecular equivalent of an aqueous solution of

zinc chloride, one equivalent of barium chloride, two equivalents of sodium hydrate, and one equivalent of sodium carbonate and mix them, when there will result a precipitate of one equivalent of zinc hydrate, one equivalent of a precipitate of barium carbonate, and four equivalents of a solution of sodium chloride. In lieu of the chlorides of zinc and barium the acetates or nitrates of these bases can be substituted, in which event the resulting solutions will be respectively the acetate or nitrate of sodium, as is obvious.

#### PROCESS OF MAKING HYDRATES OF ALKALINE-EARTH DIOXIDS.

George Francois Jaubert, of Paris, France. Patent No. 734,713, dated July 28, 1903.

This invention has for its object a novel process for the preparation of the alkaline-earth dioxides in the manner herein described.

Barium sulphide, as is well known, is one of the soluble salts of barium, which is a cheap commercial article. It is now found that a solution of this crude commercial sulphide, which contains besides the sulphhydrate also polysulphides, etc. (and which may be obtained by extracting the product of the reaction at a high temperature of carbon upon heavy spar with boiling water), is not oxidized, as would have been expected, by the addition of a solution of a hydrate of sodium dioxide, but this causes, on the contrary, double decomposition, there being formed, on the one hand, crystallized hydrated barium dioxide, with an output which sometimes exceeds ninety per cent., and, on the other hand, sodium sulphide. The dioxide obtained is remarkably pure, its standard being about ninety-five per cent.

## PROCESS OF MAKING SULPHURIC ACID.

Gustave Gin, of Paris, France. Patent No. 734,849, dated July 28, 1903.

The claim covers the improvement in the art of manufacturing sulphuric acid, consisting in first cooling the gases of sulphuretted ores as the former come from the furnace, and ridding them of the solid matters held in suspension, by deposit, then subjecting them to refrigerative action, next depriving them of sulphuric anhydride by washing with sulphuric acid, after that spraying them with cold water slightly acidulated with sulphurous anhydride, then submitting them to a heating action, next conducting the saturated solution, by this time formed, through a bed of refractory material, when it divides itself and begins to lose its sulphurous acid by contact with an air mixture, and finally expelling the sulphurous anhydride from the liquid bed by hot air bubbled up from beneath, which mixes sufficiently with the sulphurous anhydride to realize the integral oxidation in the catalytic operation.

## PROCESS OF MAKING CARBON TETRACHLORIDE.

Charles Combes, of Paris, France. Patent No. 735,948, dated August 11, 1903.

This process is based on the following observations:

First. By passing sulphur chloride ( $S_2Cl_2$ ) over carbon heated to a suitable temperature—for example, a red heat—there occurs a reaction producing a mixture of carbon bisulphide and carbon tetrachloride.

Second. If a current of chlorine is introduced at the same time into the apparatus the carbon bisulphide, formed according to the foregoing reactions, is largely converted into carbon tetrachloride and sulphur chloride, the latter of which reacts anew in the manner indicated, so that for a given quantity of sulphur chloride used a much larger proportion of carbon

tetrachloride is obtained than that corresponding with the sulphur chloride.

Third. For the sulphur chloride ( $S_2Cl_2$ ) may be substituted other sulphur chlorides richer in chlorine, or even a mixture of sulphur and chlorine.

This invention relates to a process for the manufacture of carbon tetrachloride based on the foregoing principles.

#### PROCESS OF OBTAINING PURE PYROLIGNEOUS ACID.

Gustav Glock, of Berlin, Germany. Patent No. 736,959, dated August 25, 1903.

This process is based upon the property of acid alkaline sulphates of not only eliminating tar-like matters from pyroligneous acid, but also of binding water in a higher degree than acetic acid.

If bisulphate of soda is dissolved in raw pyroligneous acid previously freed of wood-alcohol, the greater part of the tar contained in the said acid will be separated, forming at the surface a stratum of oily matter, which may be removed by filtration or by drawing off the liquid solution below said stratum. The solution thus obtained is clear, of a yellow color of wine, and becomes turbid on standing. On subjecting this fluid to distillation acetic acid will pass over, showing already a high degree of purification. Though it still contains some tar, it will when neutralized with lime form an acetate of lime of 87 up to 90 per cent., while by employing any process hitherto in use the acetate of lime obtained will only hold from 80 to 82 per cent. On examining the several fractions of distillation of the pyroligneous acid it will be found that, provided the bisulphate was added in certain proportions, the first fractions will deliver the strongest acid, while the following fractions will become weak and the latest fractions will consist only of water.

PROCESS OF MAKING SULPHURIC ACID.

John B. Francis Herreshoff, of New York, N. Y., assignor to General Chemical Company, of New York, N. Y. Patent No. 737,625, dated September 1, 1903.

This invention relates to the manufacture of sulphuric acid by the absorption of sulphuric anhydride through the medium of liquid sulphuric acid of a lower density than that to be finally produced.

The object of the invention is to provide a continuous process of great efficiency, in which provision will be made automatically for supplying the proper amount of absorbing liquid acid.

This process is intended to be used with the apparatus described in Patent No. 737,626.

PROCESS OF EXTRACTING TANNIN.

Max Hönig, of Brünn, Austria-Hungary. Patent No. 738,905, dated September 15, 1903.

This invention relates to a process for the utilization of the waste sulphite liquors obtained in the manufacture of cellulose pulp, said process consisting in that the hot liquors exhausted from the digesters are employed direct for the lixiviation of or the extraction of tannic substances from raw materials rich in such substances—such as, for instance, quebracho-wood, oak-wood, chestnut-wood, valonia, galls, etc. This process renders it possible to utilize the quantity of heat contained in the hot liquors for the purpose of promoting the lixiviating process, and besides it enables to employ the quantity of free and combined sulphurous acid contained in the liquors for decolorizing the extracts which are to be produced. Besides, the organic substances (tannic and non-tannic substances) contained in the sulphite liquors are caused to improve the process of the production of the tannic extracts by regulating in these extracts the quantitative relation be-



tween the tannin and the acid-forming organic non-tannic substances within the limits appropriate for practical purposes.

#### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 740,072, dated September 29, 1903.

The composition produced by this process consists of an intimate mixture in molecular proportions of precipitated zinc sulphide and barium sulphate, and while the composition itself is not new, the process is novel. Broadly stated, the process contemplates the successive precipitation of barium sulphate and zinc sulphide (or vice versa) from solutions capable of precipitating one or the other of said compounds, leaving a second or intermediate solution from which can be precipitated the remaining compound and a resulting solution corresponding to the first solution, from which can again be precipitated the first compound, and so on. In other words, the solution remaining as a result of the chemical reactions incident to the precipitation of one of the compounds serves as a reagent for precipitating the second compound, and the final solution after such second precipitation corresponds to the first solution from which the first precipitate was derived. It therefore results in a cyclical process or a process which is self-contained, since it does not result in any waste product or solution not capable of being utilized as a direct reagent in the process.

#### PROCESS OF MAKING PIGMENTS.

William J. Armbruster, of St. Louis, Missouri. Patent No. 740,073, dated September 29, 1903.

Broadly stated, the process consists in the precipitation of barium carbonate and zinc sulphide from solutions of barium sulphide, the carbonate of an alkali metal, and a salt of zinc.

As a general illustration of the process the following may be (9)

cited: Solutions of barium sulphide, sodium carbonate and zinc sulphate are prepared. The solutions of barium sulphide and sodium carbonate are mixed together, when barium carbonate is precipitated and sodium sulphide formed in solution. To the latter is added the zinc sulphate, when zinc sulphide is precipitated and sodium sulphate formed in solution. The latter solution is separated from the precipitates, the precipitates first mixed, washed and then drained and dried, the superfluous water being separated in a suitable manner, such as by filter-pressing.

#### PROCESS OF MAKING ACETATE OF SODA.

William M. Grosvenor, of Edgewater Heights, New Jersey, assignor to General Chemical Company, of New York, N. Y., a corporation of New York. Patent No. 741,243, dated October 13, 1903.

The object of my invention is to obtain from cheap and impure materials a high yield of acetate (and particularly acetate of soda) of great purity, good color and crystalline form. The method is, first mix a material containing sodium sulphate with other material containing calcium acetate, the latter wholly or largely in solution and preferably hot. The first-named material should contain sodium sulphate in the form of fused crystals or fused crystals partially dehydrated or anhydrous sodium sulphate fused or partly fused with as small an amount of water as possible. The mixture is to be made with such proportions of the original materials that there shall be an excess of calcium acetate. The mixture is then agitated and heated until its components have practically reached a condition of reaction equilibrium. Then while the mixture is still hot the liquid is separated from it. In case the presence of metallic impurities or of more complex organic acids in the liquid should render purification necessary this is obtained by the use of lime, followed by filtration or decanting. The result of mixing and heating the two components is the pro-

duction of sodium acetate and calcium sulphate, and of course some of the calcium acetate remains undecomposed, since this material is used in excess. Omitting reference to the impurities, the reaction may be said to proceed approximately as follows:



#### PROCESS OF PRODUCING GLYCERINE AND ACIDYLATED DERIVATIVES OF AROMATIC BASES AND THE PRODUCT THEREOF.

Oscar Liebreich, of Berlin, Germany. Patent No. 741,585, dated October 13, 1903.

This invention relates to a process of manufacturing acidylated derivatives of aromatic bases and anhydrous glycerine in one single operation; and it consists in heating glycerides of fatty acids—the so-called “fats” or “oils”—with aromatic bases. The aromatic bases for the said purpose are: 1, aniline; 2, bases of the naphthaline series; 3, aromatic diamins; 4, monoalkoyl derivates of the bases named in Nos. 1 to 3; 5, homologues of the bases named in Nos. 1 to 3 and of the monoalkoyl derivates of same.

The acidylated derivatives of aromatic bases produced in the above-described manner may be used alone or preferably in mixture with fatty acids, fats, or fat-like substances of any origin as a raw material for the manufacture of candles, wax colors, unguents, hydrophile salves, etc., because such bodies generally have higher melting-points and are more capable of absorbing water than the said fatty acids, fats and fat-like substances themselves.

#### PROCESS OF MAKING ACETIC ACID.

Johann Gottlieb Behrens and August Behrens, Jr., of Bremen, Germany. Patent No. 741,615, dated October 20, 1903.

This invention relates to a method of manufacturing concen-

trated acetic acid by treating acetate of lime wholly or partially dissolved in acetic acid by means of sulphurous acid. This method enables an almost theoretical yield to be produced and secondary reactions to be avoided and has, besides, the advantage that sulphurous acid can be employed in an anhydrous state, which prevents the acetic acid produced from being uselessly weakened by water. Moreover, this method of decomposing the acetate of lime is much less expensive than any of the methods known hitherto. A further important point is that after the acetic acid has been separated a residue of sulphide of lime remains, which in this state or converted into bisulphide of lime has considerable value. The concentrated acetic acid absorbs at a temperature of 15° centigrade about 20 per cent. of sulphurous acid and in this state dissolves the acetate of lime much more quickly than chemically-pure acetic acid.

#### PROCESS OF MAKING ANTHRAQUINONE ALPHA DISULPHONIC ACIDS.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 742,910, dated November 3, 1903.

This is a new process for the manufacture of the anthraquinone 1:5 and 1:8 disulphonic acids, which process consists in first treating anthraquinone or anthraquinone-alpha-sulphonic acid with fuming sulphuric acid in the presence of mercury or mercury compounds—such as mercurous or mercuric salts, mercurous or mercuric oxide, etc.—until a mixture of the two above-named disulphonic acids results and then separating these acids from each other.

### PROCESS OF OBTAINING SULPHATE OF BARIUM AND CHLORIDE OF ZINC.

William D. Gilman, of Roland Park, Maryland. Patent No. 746,954, dated December 15, 1903.

The object of this invention has been to provide an improved process of obtaining sulphate of barium and chloride of zinc. The claims cover:

1. The process of obtaining sulphate of barium and chloride of zinc, which consists first in bringing together barium sulphide and zinc chloride in solution; then separating the barium-chloride solution from the precipitate; then mixing the latter solution and a solution of zinc sulphate, thus precipitating barium sulphate, and then removing the zinc chloride from the supernatant solution.

2. The process of obtaining sulphate of barium and chloride of zinc, which consists first in bringing together barium sulphide of zinc chloride in aqueous solution; then separating the barium-chloride solution from the precipitate; then mixing the latter solution and an aqueous solution of zinc sulphate, thus precipitating barium sulphate, and then removing the zinc chloride from the supernatant solution.

### PROCESS OF MAKING CHROMATES OF THE ALKALINE METALS.

Francis Mudie Spence, David Dick Spence, Arthur Shearer and Thomas John Ireland Craig, of Manchester, England, assignors to Peter Spence & Sons, Limited. Patent No. 747,255, dated December 15, 1903.

This invention relates to the manufacture or production of such of the bichromates of the alkaline metals as may be commercially used in mordanting, dyeing and tanning processes, in the manufacture of dyestuffs and pigments and the like. The materials available for the manufacture are those containing chromium, sodium or potassium, and calcium.

The process consists in first preparing a mixture having the three named components, of which the first may be a chrome ore, the second sodium, as a hydrate or carbonate, and the third calcium, as an oxide, hydrate, or carbonate, and exposing it to a high temperature in a suitable furnace. The frit thus produced after mixture with water is treated with carbon dioxide and ammonia, and the resulting solution after separation from the insoluble residue is also treated with carbon dioxide and ammonia. The precipitate now formed having been separated, the solution is evaporated, its evolved ammonia recovered, and it is separated from the precipitate which is produced by the evaporation. This last precipitate is treated for the recovery of the chromic acid therein, while the clear solution is further evaporated, the resulting product being the desired bichromate.

## IV.—MACHINES.

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### APPARATUS FOR DRYING AND CONDITIONING YARNS.

James Keith and William Winship Wardle, of London, England. Patent No. 718,770, dated January 20, 1903.

This invention relates to drying-chambers and apparatus for heating and circulating air through them for the purpose of drying and conditioning yarns, fabrics and other goods; and it comprises improvements in the construction and arrangement of such chambers and apparatus for conveying the goods through the drying-chambers while being acted on by the circulating air and for automatically delivering them, whereby the necessity for operators entering the heating-chambers is obviated.

### APPARATUS FOR BLEACHING FABRICS.

Victor Floquet and Léonce Bonnet, of Reims, France, assignors to John William Willans Shaw, of Rochdale, England. Patent No. 721,436, dated February 24, 1903.

It has before been proposed to employ sulphurous-acid gas for bleaching fabrics by admitting it to a closed vessel containing the fabric and from which the air has been exhausted; but from various causes the results have not been wholly satisfactory. The inventors have discovered that one of the principal reasons for this is that the gas has been admitted at too great a pressure and not sufficiently gradually. According to this in-

vention the gas, instead of being allowed to expand into the vacuum-chamber direct from a high-pressure reservoir or other source, is first allowed to expand to about atmospheric pressure into an intermediate vessel, which also serves as a measure, and is then again allowed to expand into the exhausted vessel containing the fabric, so that the pressure in the latter vessel is less than that of the atmosphere.

#### DYEING-MACHINE.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company, of Chattanooga, Tennessee. Patent No. 721,630, dated February 24, 1903.

This is a machine for dyeing warps, the novelty of which consists in running the warps over perforated rolls with an arrangement for forcing the dye liquor through them. The claims cover the details of construction.

#### MERCERIZING-MACHINE.

Charles L. Weichelt, of Philadelphia, Pennsylvania. Patent No. 722,064, dated March 3, 1903.

This invention relates to improvements in mercerizing-machines, and more particularly to improvements in the manner of carrying the rollers which carry the yarn to be mercerized.

The claims cover the details of construction.

#### APPARATUS FOR DYEING, ETC.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company, of Chattanooga, Tennessee. Patent No. 723,795, dated March 24, 1903.

This invention relates to certain new and useful improvements in apparatus for dyeing yarns, hosiery and other materials.

The object of the invention is to dye, wash and fix the dye-



stuff on the yarns, hosiery and other material while they are submerged at all times without coming into contact with air and until the color has been set and made fast or permanent.

The invention aims to provide an apparatus particularly adapted for use in dyeing yarns, hosiery and other materials with sulphur-blacks, although the same is applicable for use with other characters of dyes. It is a well-known fact that sulphur-blacks have been in existence for a number of years; but there has been no practical way to use these colors, for the reason that if the material to be dyed or if the material during the dyeing operation comes in contact with air it oxidizes and becomes spotted. By the apparatus to be herein-after described it is impossible for the air to strike the material while being dyed, as the material at all times is immersed in the liquid during the dyeing operation and also during the washing operation.

The claims cover the details of construction.

#### MACHINE FOR SCOURING AND DYEING SKEINS.

John William Finegan, of Lowell, Massachusetts. Patent No. 724,562, dated April 7, 1903.

This invention relates to machines for scouring and dyeing skein-yarn.

The object of the invention is in a ready, simple, thoroughly efficient and practical manner, and with the output of the minimum of labor, to effect scouring and dyeing of skein-yarn.

With these and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a machine for scouring and dyeing skein-yarns.

#### APPARATUS FOR OXIDIZING TEXTILE MATERIAL.

Charles E. Wild, of Philadelphia, Pennsylvania. Patent No. 726,207, dated April 21, 1903.

In carrying out this invention the aim has been to render

the material while under treatment substantially independent of natural atmospheric conditions, thereby eliminating the element of uncertainty due to atmospheric changes; to expedite the process by causing the air or other oxidizing agent to flow through the material at any desired rate of speed, thereby rendering the period of treatment one of minutes instead of hours, as usual; to employ the same air or other oxidizing agent again and again, if desired; to insure uniformity by maintaining the oxidizing agent at a substantially uniform temperature during the treatment, and to prevent injury to the fibre by heat, the improved treatment being what may be called a "cold" treatment, in that the maximum temperature of the oxidizing agent is maintained in the neighborhood of from 85° to 95° Fahrenheit, a temperature which is incapable of injuring even the most delicate fibre under normal conditions, whereas by the methods now in use practical oxidation cannot be effected at such a low temperature, the ordinary operation requiring such a degree of heat as to cause injury to the fibre.

The apparatus is constructed to provide for the oxidizing of the goods by means of a forced blast or current of air or other oxidizing agent maintained at a substantially uniform normal temperature and free from the influence of adverse atmospheric conditions.

#### SKEIN-DYEING MACHINE.

William H. Fletcher, of Paterson, New Jersey. Patent No. 727,775, dated May 12, 1903.

This invention relates to skein-dyeing, and has for its objects the following: The immersion into and the moving automatically of the skeins through the liquid; secondly, the removing of the goods from the dyeing liquid and placing the said goods in another box for the purpose of washing the same, if desired, and for the purpose of removing the skeins or placing them easily and quickly in the machine.

The claims cover the details of construction.

## RAW-WOOL-WASHING APPARATUS.

Abraham Haas and Edgar Baruch, of San Francisco, California. Patent No. 729,333, dated May 26, 1903.

The invention relates to apparatus for washing raw sheep's wool and similar fibres by means of volatile solvents, and its object is to provide a new and improved raw-wool-washing apparatus which is simple and durable in construction, very effective in operation, easily manipulated and arranged to permit its use in local wool-growing centers. It allows of washing or cleansing raw sheep's wool and other textile fibres without the use of elaborate plants or machinery, and removes the natural greases, fats, dirt and other extraneous matter from the fibers, and to convert the by-products into merchantable materials.

The invention consists of novel features and parts and combinations of the same.

## MACHINE FOR DRYING FABRICS.

Jacob M. Levy, of Baltimore, Maryland. Patent No. 733,224, dated July 7, 1903.

The object of the invention is to provide a machine which will quickly and evenly dry fabrics which have previously been wet; and the machine is particularly designed for drying fabrics which have been wet for the purpose of shrinking before being made up into clothing.

## MANGLE.

Kristofer Henrikson, of Springfield, Massachusetts. Patent No. 733,645, dated July 14, 1903.

This invention relates to improvements in mangles or machines for pressing and smoothing cloth by a rolling action.

The object of the invention is to provide a machine for performing the cloth smoothing or ironing action in an entirely

satisfactory manner, and one which may be used for such purpose conveniently and rapidly.

The claims cover the details of construction.

#### MERCERIZING APPARATUS.

Paul Jeanmaire, of Mulhausen, Germany. Patent No. 734,333, dated July 21, 1903.

This invention relates to improvements in an apparatus for mercerizing textile fabrics; and the object of the invention is to provide means for stretching the fabric after the same has been impregnated with the mercerizing fluid, so that the fabric becomes of greater width than when it left the bath, and a silk-like gloss is imparted to the goods, while the fabric remains of the same, or approximately the same, length.

For this purpose the invention consists in the combination, in a mercerizing apparatus, of a plurality of laterally-acting card-clothed extensor-rolls located to operate in succession upon the impregnated fabric; and the invention consists, further, in the combination with these rolls, arranged as stated, of setting-rolls and of means for washing the fabric.

#### APPARATUS FOR DYEING OR BLEACHING.

Franklin A. Weller, of Philmont, New York. Patent No. 735,183, dated August 4, 1903.

This invention relates to apparatus upon which skeins of yarn may be mounted and by which the yarn will be dipped into a vat or tank for dyeing, bleaching, or the like.

The objects of the invention are to provide an apparatus upon which the skeins of yarn may be conveniently mounted, carried into, and removed from the vat and reversed in position end for end at the bottom and top of the carrier with a minimum expenditure of time, and by which the skeins will be held in suitable position to insure proper dipping and

trailing in the vat and be automatically shifted on the skein-sticks in a manner to insure access of the liquid uniformly to all parts of the material.

For this purpose the machine consists of a suitable carrier upon which skein-sticks may be mounted at suitable points, which is preferably in the form of two parallel endless-chains provided with adjustable clips for supporting the skein-sticks, guides within and outside of the vat under and over which the carrier passes, and preferably consisting of sprocket-wheels mounted upon a common axle and upon which the chains travel, and a drag bar or bars or retarding device over which the skeins of yarn drag during their circuit for the purpose of shifting and turning them upon the skein-sticks. These drag-bars preferably consist of sleeves surrounding the axles of the sprockets, so that the shifting and turning of the yarn occur at the points where the carrier passes its guides.

The claims cover the details of construction.

#### APPARATUS FOR USE IN MERCERIZING.

John Roberts Ecob, of Lawrence, Massachusetts. Patent No. 737,374, dated August 25, 1903.

The novelty of this invention consists in the arrangement of rolls closely adjacent to each other and immersed in the solution to treatment by which the material is being subjected. These rolls are arranged in upright relation one above another to secure advantages of compactness and a desirable application of their weight to the material, and it will be found of considerable advantage to gear the rolls together and drive them positively; but a horizontal or other arrangement of such rolls and the use of means other than gravity to maintain them in proper relation to the material under treatment may be used.

A very high degree of efficiency may be obtained from an apparatus wherein the material is led to and fro between and in the most intimate peripheral contact with the respective

members of a plurality of adjacent stacks of rolls, to the squeezing action of which the material is subjected preferably time after time while immersed in the fluid agent and preferably not released from the tenacious surfaces of the rolls throughout its period of immersion and until set or at such a stage that its contractile tendency shall have ceased to be harmful.

#### APPARATUS FOR MERCERIZING.

Robin Boral and Alfred Kymer, of Middleton, near Manchester, England, assignors to the Windsor Company, of New York, N. Y. Patent No. 739,580, dated September 22, 1903.

This invention relates to an improved, simple and economical machine for mercerizing textile fabrics; and it consists in features of construction and novel combination of devices in mercerizing mechanism.

The essential parts consist of a trough for the impregnating solution, a guide-roll in said trough, an expander on one side of the guide-roll, a pair of squeezing-rolls on the other side of the guide-roll, a series of cylindrical rolls with which a fabric may have continuous surface contact throughout the series and over the first of which the fabric passes directly from the squeezing-rolls, and a series of water-spraying pipes arranged over a number of said cylindrical rolls close to the end of the series.

#### FABRIC-PRINTING MACHINE.

John Glasgow Sanderson, of Manchester, England, assignor to Mather & Platt, Limited. Patent No. 743,038, dated November 3, 1903.

This invention relates to machines for printing fabrics of the kind in which the printing-rollers are forced into and out of contact with the fabric at predetermined intervals while the fabric is being printed. For this purpose endless revolving chains are employed, these having suitable projections fixed

at the required distances apart, so as to act as the measuring apparatus for regulating the intervals of contact of the printing-rollers. The chains can be lengthened or shortened, so as to obtain a great number of diversity of intervals or contact. As the chains travel the projections on them through suitable mechanism actuate an arrangement for throwing a clutch in and out of gear. When the clutch is thrown in gear, motion is given to cams having projections that force the printing-rollers out of contact with the fabric and having depressions which allow the rollers to be forced back into contact with the fabric by weights or springs or the like. Preferably the cam-shaft passes through a tubular shaft carrying the main bowl of the printing-machine, which shaft revolves in suitable bearings in the side frames.

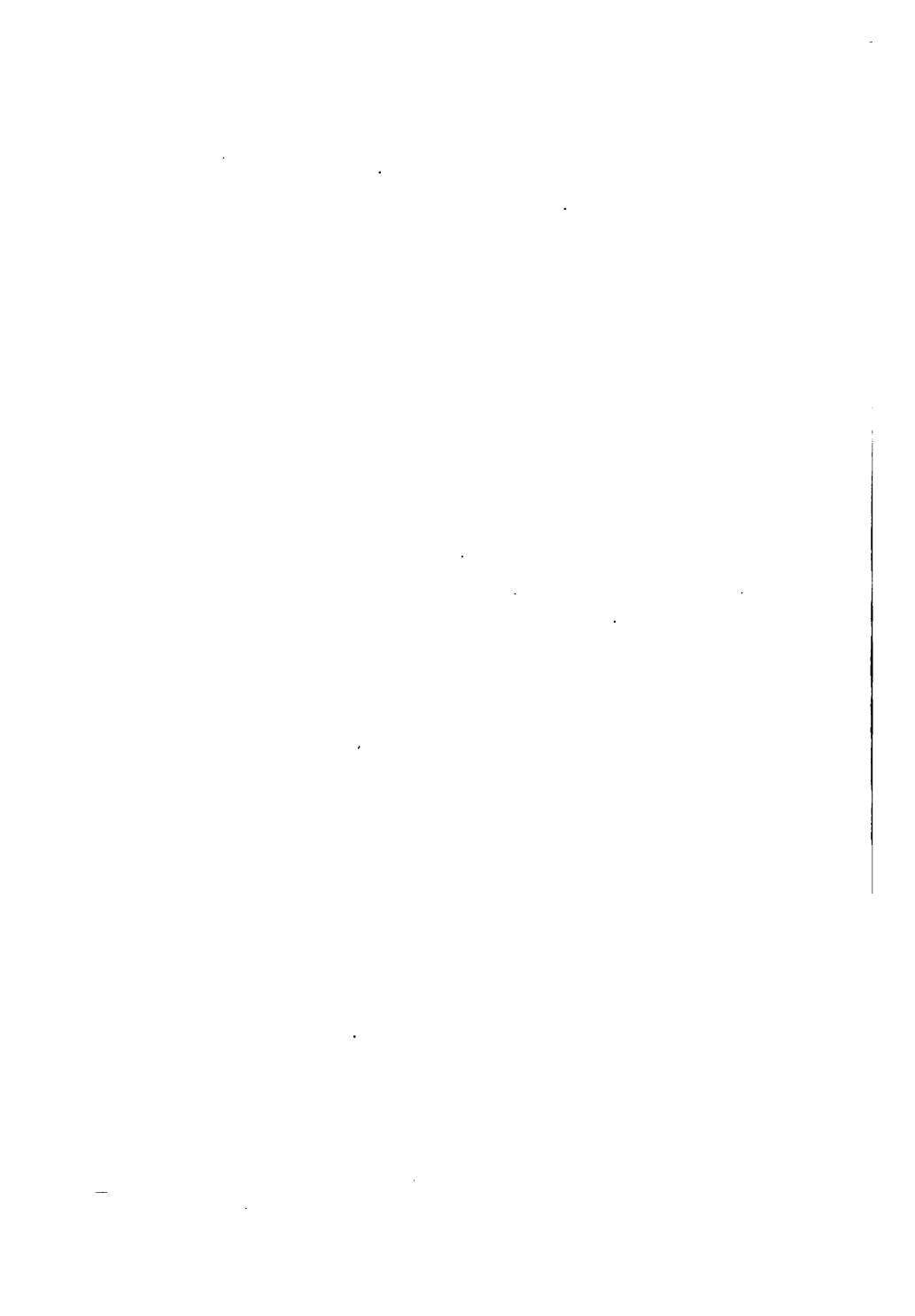
The claims cover the details of construction.

#### APPARATUS FOR DYEING CARD-SLIVERS.

Diego Mattel, of Genoa, Italy. Patent No. 746,863, dated December 15, 1903.

This invention refers to certain improvements in the apparatus for dyeing card-slivers, forming the object of Patent No. 705,856. Said improvements are designed to obtain an apparatus as efficient as that described by the former patent in as far as concerns the continuous impregnations of the cotton slivers with liquid and the dripping of the impregnated cotton into the dye-baths without the slivers becoming dis-aggregated by the action of viscous or high alkaline baths. By the employment of the present improvements the carrier-belts in the dye-vats are entirely done away with and the machine rendered thereby much simpler and cheaper.

The claims cover the details of construction.





## V.—MISCELLANEOUS.

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APPARATUS FOR THE MANUFACTURE OF SULPHURIC ANHYDRIDE.

John B. Francis Herreshoff, of Brooklyn, New York. Patent No. 719,333, dated January 27, 1903.

This invention relates to apparatus for the manufacture of sulphuric anhydride according to the so-called "contact" process, and has for its object to provide an apparatus of this class which will permit of a ready regulation of the temperature, so as to obtain a high efficiency, and to keep the heat within relatively low figures, so that the durability of the plant will be materially increased.

To this end is employed an apparatus comprising a plurality of contact-chambers and connections by means of which incoming gas is caused to pass through said chambers in succession, and in addition in the connection from one contact-chamber to the next, a heat-exchange apparatus by means of which the heat of the outgoing mixture is absorbed by the incoming mixture, so that at the same time a heating of the unconverted mixture and a cooling of the partially-converted mixture is obtained, thus bringing both to the temperature which is best adapted for the starting and the continuation, respectively, of the contact reaction.

## PIGMENT AND PROCESS OF MAKING SAME.

William J. Armbruster, of St. Louis, Missouri. Patent No. 719,415, dated February 3, 1903.

This invention relates to improvements in processes of manufacturing pigments and in the product resulting therefrom; and it consists, in the novel process and in the novel product.

(10)

The composition consists of an intimate mixture of precipitated barium sulphate, zinc sulphide and barium carbonate in various proportions, said proportions depending on the relative proportions of the respective solutions constituting the mixtures from which the salts are precipitated. In the preparation of the compound are employed mixtures of solutions of zinc sulphate, a carbonate of an alkali metal, and barium sulphide, the precipitates being formed in the order of the chemical affinities between the several bases and acids.

#### ORGANIC ACID MORDANT AND PROCESS OF MAKING SAME.

Wilhelm Beckers, of New York, N. Y. Patent No. 719,555, dated February 3, 1903.

The claims cover:

1. The process for the preparation of a new organic acid compound consisting in collecting the liquid gradually drawn from vegetables by pressure in the pickling process with salt, concentrating the same and removing the precipitated vegetable matter by filtration.

2. The reducing liquid derived from waste-salt pickle by evaporation and removal of the precipitated impurities which is an acid liquid of a specific gravity of 20° to 30° Baumé, free from albuminoids and adapted for use in dyeing, tanning, etc.

#### HYDROSULPHITE FOR REDUCING INDIGO.

Max Bazlen, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin & Soda Fabrik. Patent No. 719,720, dated February 3, 1903.

The claims cover:

1. As a new article of manufacture, the indigo-reducing agent which can be obtained by the reduction of a mixture of sodium bisulphite and sulphurous acid, which in its purified form has a chemical composition corresponding to the formula

$\text{Na}_2\text{S}_2\text{O}_4 + 2\text{H}_2\text{O}$ , and one hundred cubic centimetres of a 17° Baumé solution of which in water contain nine grams or more of sodium hydrosulphite, as shown by its reducing capacity for indigo.

2. As a new article of manufacture, the solution of indigo-reducing agent which can be obtained by the reduction of a mixture of soluble bisulphite and sulphurous acid and one hundred cubic centimetres of which at 17° Baumé contain nine grams or more of alkali hydrosulphite, as shown by its reducing capacity for indigo.

#### ACID CHAMBER FOR SULPHITE WORKS.

William Andrew McKee, of Hineckley, New York. Patent No. 719,844, dated February 3, 1903.

The claims describe:

1. An acid-chamber for sulphite-works, comprising a closed cylindrical vessel provided with a series of conical hoppers, and a revolvable shaft mounted within said vessel and provided with conical deflectors, means for creating a partial vacuum for the purpose of drawing acid gases through the said vessel, means for passing an alkaline liquid through said vessel in a direction opposite to that of the travel of said gases, and means for removing the heat generated chemically within said vessel.

2. An acid-chamber for sulphite-works, comprising a vertically-disposed cylindrical vessel provided with a series of conical hoppers, a cylindrical water-jacket incasing said vessel, a revolvable shaft mounted within said vessel, conical deflectors mounted upon said shaft, a pipe connected with the bottom of said vessel for supplying an acid gas therinto, a pipe for admitting an alkaline liquid to the top of said vessel, means for rotating said shaft, a tank disposed adjacent to said vessel for holding a weak alkaline solution, and pneumatic mechanism for drawing said acid gas through said vessel and forcing the same through said tank.

**ANTHRACENE DERIVATIVES AND PROCESS OF MAKING SAME.**

Max Kugel, of Wiesdorf, near Cologne, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 722,719, dated March 17, 1903.

This invention relates to the manufacture of new derivatives of the anthracene series by causing oxidizing agents to act on such alpha-aphylamidoanthraquinones and derivatives thereof as contain a hydroxy group in ortho position to the aphylamido group.

The oxidation can be carried out by means of the usual oxidizing agents, such as manganese dioxide, chromic acid, fuming sulphuric acid, nitro compounds, lead peroxide, mercuric oxide, or the like.

The above-mentioned ortho-oxy-alpha-aphylamidoanthraquinones can be prepared, for instance, on replacing the nitro group in the corresponding alpha-nitro-ortho-hydroxy compounds by the aphylamido group. This replacement can be effected by condensation of the said nitro-hydroxy compounds with aromatic amines.

The new derivatives are crystalline compounds soluble in pyridine, producing from violet to greenish-blue solutions.

**BENZYLNAPHTHYLAMIN-SULPHONIC ACID AND PROCESS OF MAKING SAME.**

Ivan Levinstein and Carl Mensching, of Manchester, England, assignors to Levinstein. Patent No. 722,861, dated March 17, 1903.

The inventors have found that a new benzyl-naphthylamin-sulphonic acid is produced when alpha-alpha-naphthylamin-sulphonic acid is heated with benzyl chloride in the presence of caustic or carbonated alkali.

The new acid combines with diazo derivatives of amidoazo compounds, giving rise to a very valuable series of polyazo

coloring-matters which produce on wool shades which are much bluer and brighter than those which are produced by the corresponding coloring-matters from the unbenzylated acid.

#### APPARATUS FOR MAKING SULPHURIC ANHYDRIDE.

William C. Ferguson, of Flushing, New York, assignor to General Chemical Company, of New York, N. Y. Patent No. 723,595, dated March 24, 1903.

The claims cover:

1. An apparatus for the manufacture of sulphuric anhydride, comprising a plurality of contact-chambers, a connection-pipe from the outlet of one chamber to the inlet of the next, an air-supply pipe branched on such connection-pipe, and a regulating device on the air-supply pipe.

2. An apparatus for the manufacture of sulphuric anhydride, comprising a plurality of contact-chambers, a connection-pipe from the outlet of one chamber to the inlet of the next, and an air-supply device leading to said connection-pipe between said two contact-chambers and so that air will be admixed to the partially-converted product while the latter is away from the catalytic substances.

#### ART OF PREPARING CELLULOSE FILMS OR FILA- MENTS.

Friedrich Lehner and Alfred Lehner, of Zurich, Switzerland. Patent No. 724,020, dated March 31, 1903.

This invention relates to the preparation of films and filaments and the like from cellulose solutions; and the object of the same is to prepare such articles having a colorless glossy appearance in a rapid and practical manner.

A viscose solution, which may be prepared in suitable manner, is caused to issue into a moderately-concentrated sulphuric-acid bath through contracted openings in a manner well known. A filament which is turbid or milky white by reason of the sulphur or sulphur compounds existing in the

materials operated with is thrown out, which thread after passing a short distance from the sulphuric acid is wound upon spools, bobbins, or reels outside of this congealing sulphuric-acid bath. These spools, bobbins, or reels when filled are immediately immersed into a bath which has the property of eliminating the sulphur or sulphur compound existing in the films or filaments. For this purpose sulphydrates, sulphides, sulphites and bisulphites of the alkali and alkaline earths are admirably adapted, desulphurizing the filaments or films completely or to such an extent that they produce a colorless glossy product. After this treatment has been carried to a sufficient extent—that is to say, when the threads or filaments appear colorless and glossy—the product is washed with hot water and dried.

#### PIGMENT AND PROCESS OF MAKING SAME.

William J. Armbruster, of St. Louis, Missouri. Patent No. 724,234, dated March 31, 1903.

The composition consists of an intimate mixture of the precipitates of barium carbonate and zinc hydrate in proportions determined by the molecular combination of the soluble salts from which the precipitates are derived. In the preparation of the compound the inventor uses mixtures of solutions of barium hydrate, sodium carbonate, and zinc chloride (or equivalent soluble salt), whereupon there results a compound precipitate of barium carbonate and zinc hydrate, leaving in solution sodium chloride. In lieu of sodium carbonate a carbonate of any of the alkali metals—for example, potassium carbonate or ammonium carbonate—may be used, and in lieu of zinc chloride the sulphate, acetate, nitrate, or other soluble salt of that metal may be employed. The precipitates referred to may be formed consecutively in any order which practical considerations may dictate, or they may be formed simultaneously. In the first instance an intimate mixture

thereof may be effected by grinding or any form of mechanical agitation. In the second instance the mixture is effected in the act of precipitation.

#### APPARATUS FOR THE MANUFACTURE OF SULPHURIC ACID.

Oscar H. Eliel, of La Salle, Illinois. Patent No. 725,427, dated April 14, 1903.

The invention relates to the construction of a concentrating and denitrating tower and to the application of the same to the sulphur-burners and acid-chamber.

#### PIGMENT AND PROCESS OF MAKING SAME.

William N. Blakeman, Jr., of New York, N. Y. Patent No. 726,623, dated April 28, 1903.

The object of this invention is to treat zinc pigments used in the manufacture of paints in such a manner that the characteristic of "spreading power" will be imparted to those pigments which wholly lack this characteristic and increased in those pigments which partly possess it.

The inventor claims that this characteristic of spreading power can be imparted to all pigments, whether their condition be crystalline, comminuted, or amorphous, by incorporating a hydrated oxide (or hydroxide) with the pigment before it is ground in a vehicle to form a paint. The hydroxides which may be used are those of zinc, lead, manganese, and aluminium, and such other metallic or earthy hydroxides as may be found suitable for use.

The pigments which may be treated by this process embrace all those zinc pigments which are partly or wholly deficient in spreading power, such as oxide of zinc or zinc-white, carbonate of zinc and zinc sulphide or oxysulphide.

### SIZING.

George A. Fredenburgh, of Pawtucket, Rhode Island. Patent No. 728,697, dated May 19, 1903.

The composition of the size consists of the following ingredients, combined in the proportions stated, viz.: Water, practically pure, forty gallons; potato-starch, seventeen pounds; oxide of tin, one-half pound; oxide of zinc, one-half pound.

The above ingredients are steamed until they thicken and bubble, after which the following proportions of ingredients are mixed with them: Wood-alcohol, one-half pint; naphtha, one-half pint; caustic soda of one and one-half degrees of strength, one-half pint.

The proportion of wood-alcohol is mixed with the first mixture for one minute. The proportion of naphtha is then mixed with them for two minutes, after which the proportion of caustic soda is mixed with them. The yarn or thread to be sized by this composition of matter is of a dull-gray color and contains a certain percentage of dye, so that in the use of this mixture the sizing emulsion acts upon and softens up the dye in the thread and brings out a jet-black color.

### APPARATUS FOR MAKING SULPHURIC ACID.

Nicholas L. Heinz, of La Salle, Illinois. Patent No. 728,914, dated May 26, 1903.

The invention relates to the acid-chambers and the flues for introducing the gases into same. The chambers are ordinarily arranged in series with a Glover tower, and the flues for conducting the gases to the chambers enter the first chamber at the front end near the centre at the top, and are similarly arranged to connect the other members of the series, the several chambers of the flues being extended in the same general direction, so that jets and exits of gases passing the flues enter and leave the chambers in the same general direction as that in which they pass along through the chambers. This



but imperfectly utilizes the chamber-space for diffusion and oxidation in the production of acid. This invention provides an arrangement of the flues relatively to the chambers whereby the gases passing in the flues enter and leave the chambers at opposite sides at different levels and in directions transverse to their general course in making passage through the chambers, the objects being to effect a greater travel of the gases in the chamber-space and a more thorough diffusion and consequent increased oxidation thereof in the chamber-space, and thus to secure an increase of acid product in any given chamber-space over the old way.

#### PAINT AND PROCESS OF PRODUCING SAME.

Cushing Adams, of Bellows Falls, Vermont. Patent No. 730,506, dated June 9, 1903.

This improved paint or coating composition comprises a mineral base—as talc, whiting, gypsum, or kaoline—preferably consisting of kaoline and gypsum in about equal proportions; or it may consist entirely of either kaoline or of gypsum alone, or it may consist entirely of any one of the other materials. Combined with this mineral base is an adhesive consisting of casein which has been previously treated with an alkaline material—such as borax, carbonate of soda, or soda-ash, but preferably with soda-ash—and alum or its chemical equivalent is added to the mineral base and adhesive for the purpose of giving a jelly-like body to the paint or coating mixture and also to augment the hardening and water-resisting qualities of the paint or coating composition when a suitable quantity of water has been added to the dry components to form the paint or coating.

Lime is used in the composition to give it water-resisting qualities in addition to those qualities which are obtained by the use of alum.

**SULPHO-ACID OF AROMATIC ALDEHYDE AND PROCESS  
OF MAKING SAME.**

Arnold Steiner, of Basle, Switzerland, assignor to the firm of Chemical Works, formerly Sandoz. Patent No. 731,139, dated June 16, 1903.

Sulpho-acids of aromatic aldehydes have been obtained by "sulphonation" of the benzaldehyde, and lately by transformation of the chlorinated benzaldehydes with alkali sulphites under pressure.

While the hydrocarbons such as toluene, xylene, or their nitro products are easily converted into aldehydes, the toluene or xylene sulpho-acids are produced by oxidation in either alkaline or acid aqueous solution, principally the respective sulphobenzoic acids. Having observed that by this means are always obtained small quantities of aldehydes besides their sulphobenzoic acids, the inventor has discovered the conditions under which aldehydes exclusively are formed.

The process is based on the oxidation without water in the presence of anhydrous sulphuric acid. The oxidation of the methyl group remains stationary in the formation of aldehyde only even if the oxidizing material is in excess, and, on the contrary, this excess is necessary to obtaining good yields.

**PIGMENT AND PROCESS OF MAKING SAME.**

William J. Armbruster, of St. Louis, Missouri. Patent No. 731,153, dated June 16, 1903.

The composition consists of an intimate mixture of the precipitates of basic zinc carbonate, barium sulphate, and barium carbonate in proportions determined by the molecular weights of the soluble salts from which the precipitates are derived. The composition may be extended to include zinc sulphide as an additional ingredient.

In the preparation of this composition the inventor uses mixtures of solutions of zinc sulphate, the carbonate of an

alkali metal, and a salt of barium, first mixing the zinc salt with the alkali carbonate, whereupon there is precipitated the basic zinc carbonate, leaving the sulphate of the alkali metal in solution. To the latter is added an additional quantity of the alkali carbonate, and then a solution of the barium salt is added in sufficient quantity to react with the alkali-metal sulphate and carbonate, whereby barium sulphate and barium carbonate will be precipitated, leaving in solution a final salt whose acid depends on the character of barium salt used as the reagent. The alkali-metal carbonates used may be either those of sodium, potassium, or ammonium. The barium salts used may be any of the water-soluble salts, such as the sulphide, chloride, acetate, nitrate, hydrate, and the like.

#### COMPOSITION FOR REMOVING GREASE, ETC.

Henrietta D. Sudman, of Boyne, Michigan. Patent No. 731,521, dated June 23, 1903.

This composition consists of the following ingredients combined in the proportions stated, viz.: Pure rain-water, 520 parts; shaving-soap, five parts; borax, two parts; ether, sixteen parts; alcohol, sixteen parts; glycerine, eight parts; ammonia (tincture), sixteen parts; essence of wintergreen, four parts; chloroform, two parts. The shaving-soap and borax are boiled with the water until dissolved. The mixture is then allowed to cool and the other ingredients added and the whole thoroughly mixed by agitation and promptly bottled.

#### APPARATUS FOR MAKING SULPHURIC ANHYDRIDE.

Carl Daub, of Antwerp, Belgium, assignor of one-half to Julius C. Deuther, of Detroit, Michigan. Patent No. 731,758, dated June 23, 1903.

This invention relates to apparatus for making sulphuric anhydride by the method of passing a mixture of sulphur dioxide and oxygen through a contact substance. The heat produced by the reaction must be prevented from accumulating in the

contact substance; and it is the object of my invention to keep this heat under such control that overheating is prevented, while at the same time it constitutes the source of heat for maintaining the gases and contact material at the elevated temperature required for useful work.

This invention consists of an apparatus composed of alternately-arranged series of heating and contact chambers through which the gases pass, the heating-chambers provided with independent means for heating (or cooling) the gases and the contact-chambers adapted to provide a passage for the whole bulk of the gas conducted into the apparatus through contact material disposed in the contact-chamber in such manner that the gases and contact matter reciprocally maintain and equalize the temperature in the chamber and prevent local overheating, so that the whole contact matter is maintained in a state of useful activity.

#### WATER-PAINT.

Samuel S. Ruston and Benjamin Ruston, of Syracuse, New York. Patent No. 732,894, dated July 7, 1903.

This invention relates to improvements in the composition in water-paints and method of producing the same.

Its object is to produce such a composition which may be used for either indoor or outdoor work, cheap and durable, and the further object of producing the same by an inexpensive method.

The inventors have found that by combining common cheese-curd, wet or dried, with oil or fat in an intimately and finely-divided state, such composition being mixed with an alkaline solvent and mixed up with water, produces a tough waterproof film. This composition is mixed with lime slaked with a solution of alumina sulphate, and the result is a composition which when mixed with water forms on drying waterproof-paint or adhesive mixture which is adapted for sizing, wall-coating, etc.

**WATER-PAINT AND METHOD OF PRODUCING SAME.**

Samuel S. Ruston and Benjamin Ruston, of Syracuse, New York. Patent No. 732,895, dated July 7, 1903.

This invention consists in a waterproof paint composed of the several ingredients thoroughly mixed and commingled together, and in the several new and novel steps constituting the process by which such waterproof paint is prepared.

The inventors have discovered that by combining common cheese-curd, either wet or dry, with resin in its finely-divided state such composition when mixed with an alkali solvent and then again mixed with water produces a tough waterproof film. This composition is mixed with lime slaked with a solution of alumina sulphate, and the result is a composition which when mixed with a given quantity of water forms on drying a waterproof paint or adhesive mixture which is adapted for sizing, wall-coating, etc.

**ACETYL CELLULOSE.**

Arthur Elchengrün and Theodor Becker, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 734,123, dated July 21, 1903.

This invention relates to the production of a new acetylated derivative of cellulose, which is characterized by the fact that it is readily soluble in alcohol. The process for preparing this new body consists in treating hydrocellulose with a mixture of acetic anhydride and sulphuric acid.

The process differs from that described in Letters Patent No. 654,988, by Lederer, in that a larger quantity of sulphuric acid is used.

The new acetylated derivative of cellulose is a white mass readily soluble in alcohol. Its concentrated alcoholic solution represents in the cold a solid mass like gelatine, which liquefies on heating or on adding alcohol. From the solutions in alcohol, acetone, glacial acetic acid, or the like, the new body is precipitated in the shape of white flakes by the addition of water.

PIGMENT AND PROCESS OF MAKING SAME.

William J. Armbruster, of St. Louis, Missouri. Patent No. 734,392, dated July 21, 1903.

The composition consists of an intimate mixture of the precipitates of basic zinc carbonate and barium carbonate, with or without an admixture of zinc sulphide, and in proportions determined by the molecular weights of the soluble salts from which the precipitates are derived. In the preparation of this composition mixtures of zinc salts, barium salts, and the carbonates of the alkali metals are used, bringing them together in an order to effect the necessary precipitation, it being understood that the salts of zinc and barium are preferably such as will not react on each other.

As an illustration of the general principle here stated solutions of zinc chloride and barium chloride, or zinc nitrate and barium nitrate, or zinc acetate and barium acetate are prepared, and to each of these added the carbonate of a suitable alkali metal, thereby effecting a precipitation of the respective basic carbonate of zinc and carbonate of barium.

APPARATUS FOR MAKING SULPHURIC OR OTHER ACIDS

John G. Graham, of Bramhall, Stockport, England. Patent No. 736,087, dated August 11, 1903.

This invention relates to the manufacture of sulphuric, hydrochloric, nitric and other acids, and is designed to provide improvements in and relating to apparatus for readily and effectively breaking up, mixing or assimilating, and condensing the gases in such manufacture, particularly in that of sulphuric acid.

At present in the manufacture of sulphuric acid one or more (generally three) large chambers are used for the mixing and condensation of the gases into the liquid acid, which chambers cover a large space and are very costly to erect. This

invention is designed to dispense with these chambers or where they are already erected to increase and improve the output from the plant.

The old sulphuric-acid chambers were required for the mixing and assimilating of the various gases—viz., the sulphur dioxide, steam and nitrogen trioxide—used in its manufacture. In place of these chambers and for the same purpose are formed flues, passages, or columns provided with a number of contact or obstruction pieces placed across such passages, flues, or columns to break and mix or assimilate and condense the gases. These contact-pieces are made of glass, earthenware, metal, or other suitable material (at present I prefer to use glass) and are of angular, semi-circular, channel, or other section. The internal surfaces may be corrugated to aid the breaking up and assimilating, or they may be smooth.

#### MECHANISM FOR THE REDUCTION OF PYROLIGNEOUS ACIDS.

Winfield Scott Brandt, of Binghamton, New York. Patent No. 737,067, dated August 25, 1903.

This invention relates to mechanism for the reduction of pyroligneous acids and means for rendering the process continuous, economical, and effective as a commercial process.

In the mechanism and construction heretofore used there has been large loss, due to idleness of the plant incident to repair of any unit of the battery of retorts, condensers and the like; also, much waste of heat has occurred, and the efficiency of the plant has been much lessened by the large fall in temperature and pressure of steam supply incident to long lines of piping and absence of any means to overcome such fall in temperature and pressure after the steam leaves the boilers.

The object of the invention is therefore, first, to render it possible to recharge or repair any unit of the battery without

any shut-down or loss to the remaining portions of the battery; second, to provide the stills and evaporating-pans with live steam, and, third, to save and utilize to the largest possible degree the heat formerly lost.

#### ABSORBER FOR THE MANUFACTURE OF SULPHURIC ACID.

John B. F. Herreshoff, of New York, N. Y., assignor to General Chemical Company, of New York, N. Y. Patent No. 737,233, dated August 25, 1903.

This invention relates to apparatus used in the manufacture of sulphuric acid by causing a mixture containing sulphuric anhydride to be absorbed by a body of liquid acid.

The object of the present invention is to provide an apparatus of the above-indicated class which effects a thorough distribution of the anhydride or of the gaseous mixture containing the same in the liquid acid used for absorbing the anhydride, in which, further, the body of liquid will be kept in continuous motion, so as to bring, as far as possible, constantly renewed portions of liquid in contact with the anhydride.

#### APPARATUS FOR MANUFACTURING SULPHURIC ACID.

John B. Francis Herreshoff, of New York, N. Y., assignor to General Chemical Company, of New York, N. Y. Patent No. 737,626, dated September 1, 1903.

This invention relates to the manufacture of sulphuric acid by the absorption process, and has for its object to provide an apparatus for continuously producing liquid sulphuric acid in an economical manner and with a practically complete absorption of the sulphuric anhydride from the gaseous mixture containing the same.

It also contemplates the provision of automatically-operating means for regulating and supplying the proper amount of absorbing liquid acid.

The claims cover the details of construction.



## EFFERVESCENT LAUNDRY BLUING.

William C. Pope, of St. Louis, Missouri. Patent No. 738,481, dated September 8, 1903.

This invention consists in an effervescent coloring substance, preferably in form of a tablet, or granular, as an article of manufacture and in the method of making the same.

The substance consists, specifically, of a suitable blue and oxalic acid, with a soluble alkaline carbonate, such as bicarbonate of soda, and tartaric acid, or citric acid, or both.

This is not a novelty, as this kind of bluing was produced in commercial form at least six years ago.

## 1-ACETYLAMIDO-2-4-DIAMIDOBENZENE.

Oscar Dressel, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 742,845, dated November 3, 1903.

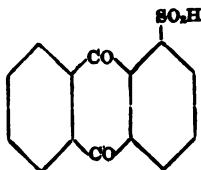
This invention relates to the production of the hitherto-unknown 1-acetylamido-2-4-diamidobenzene.

The process for producing this body consists in treating 1-acetylamido-2-4-dinitrobenzene with such reducing agents as act in a moderate manner—e. g., iron filings and dilute acetic acid or iron filings and small quantities of mineral acids or the like. The new compound thus obtained is a white crystalline powder melting at from 158° to 159° centigrade. It is soluble in water and less soluble in alcohol and benzene. On boiling it with glacial acetic acid it is transformed into amidomethylbenzimidazol having the known properties.

## ANTHRAQUINONE-ALPHA-SULPHONIC ACID.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 743,664, dated November 10, 1903.

This invention relates to the manufacture of the hitherto unknown anthraquinone- $\alpha$ -sulphonic acid having the formula:



The process for producing this body consists in treating anthraquinone with concentrated sulphuric acid or fuming sulphuric acid of low percentage of  $\text{SO}_3$  in the presence of mercury or mercury compounds—such as mercurous or mercuric salts, mercurous or mercuric oxide, or the like. For this purpose a very small quantity of mercury or of mercury compounds is sufficient, the action of these bodies being only a so-called “catalytic” one.

In order to avoid the production of disulphonic acids, it is profitable to carry out the process in such a manner that anthraquinone is only partly attacked by the sulphuric acid, and the other part rests unattacked.

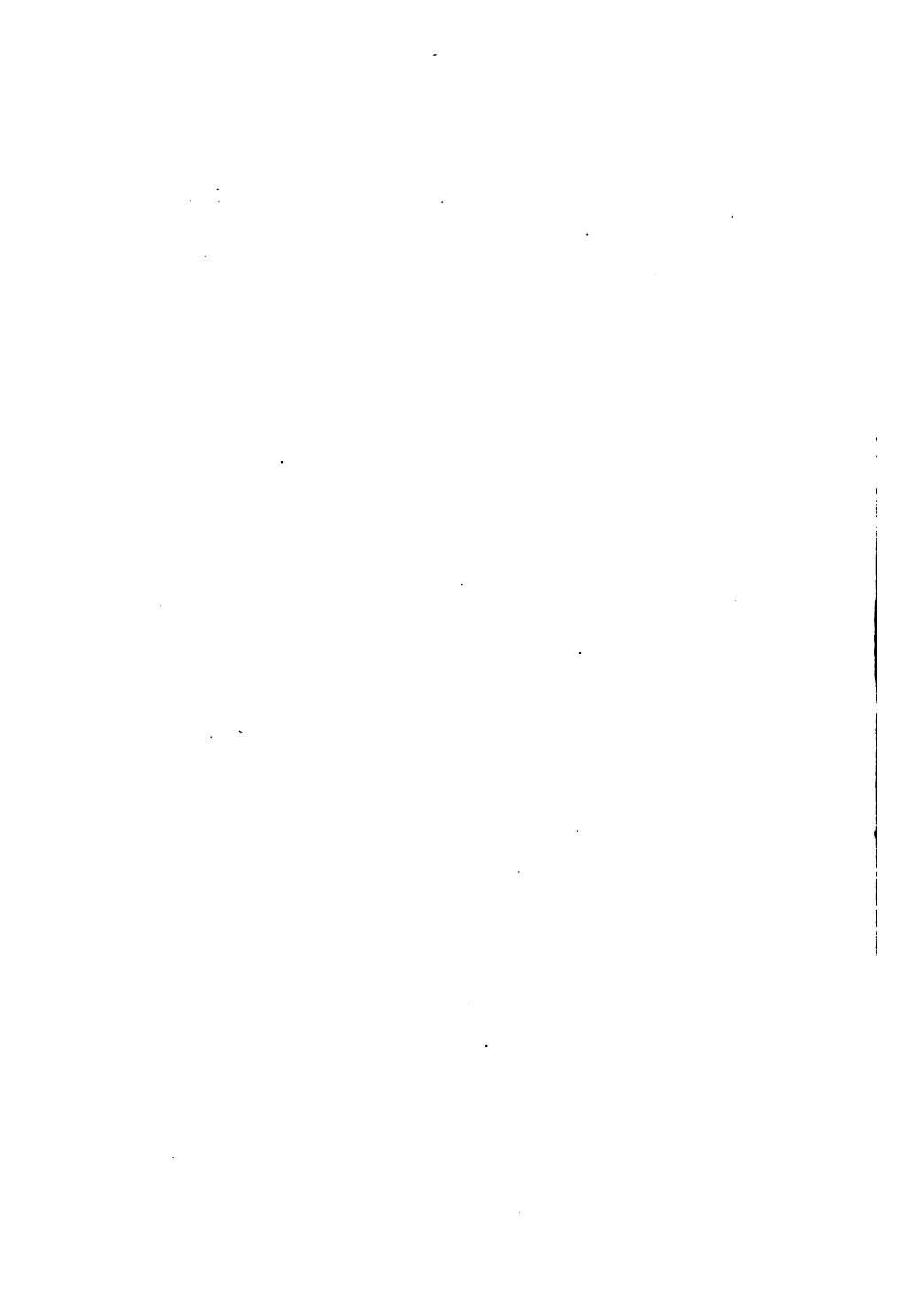
#### LIGHT INDIGO POWDER.

Paul Seidel, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 744,417, dated November 17, 1903.

The present invention consists in the conversion of dry indigo into a powder readily soluble in the vat by treatment in a disintegrator, and is particularly applicable to synthetic indigo and sufficiently pure brands of plant indigo; but impure vegetable indigo containing a large proportion of gummy or other impurities which tend to cement the indigo particles together cannot be treated with advantage.

The claim specifies the new form of indigo which can be

obtained as hereinbefore described, which is a powder whose specific gravity is within the range of from one-tenth to twenty-five hundredths and which after having been thoroughly moistened with water is capable of yielding a homogeneous paste containing 20 per cent. of indigo which does not deposit indigo on standing undisturbed for three months and which is dissolved by a bran and madder fermentation-vat.



PART IV.

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NOTES ON PROCESSES.



## IV.—NOTES ON PROCESSES.

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### WETTING-OUT COTTON PREPARATORY TO DYEING.

Under various names, certain products, being none other than single oils or mixtures of oils treated with concentrated sulphuric acid and exactly neutralized or made strongly alkaline with ammonia, are sold for the purpose of dissolving from cotton the natural oils and waxes found thereon, which act as a preventive to level dyeing, etc.

Justin-Muller has found by experiments covering a long period that ordinary soap meets every requirement, and at a considerably lower cost, the money value of the two products taken into consideration. He has found that palm-oil soap is superior in efficiency to olive-oil or castor-oil soap, but both of these being superior to any sulphated oil.

Like any other soap solution, they should not be used in hard water.

If a good quality of mill soap is dissolved to a clear solution, given a distinct ammoniacal odor with ammonia water, and used in the proportion of about one quart to 150 pounds of cotton, good results in wetting-out will be secured.—*Textile World-Record*.

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### THE SCOURING OF WOOL WITH SOLVENTS.

There can be no doubt remaining in the mind of any person more or less familiar with animal fibres, that wool of either medium or high grades, when scoured by the usual process with soap and soda, or potash solutions, is less desirable in feel, etc., than the same grade of wool when cleansed by means of some volatile solvent.

It is remarkable that with all the inducements offered to woolen manufacturers and others, in the shape of higher prices, etc., that they do not adopt some scheme whereby they might be able to avail themselves of this condition, by making use of some one of the modern processes for treating and handling the wool in a scientific manner.

The choice of process to adopt for this purpose is not difficult when we consider that any hydrocarbon solvent will meet the requirement, but experiments covering a long time and conducted upon a large scale have demonstrated that ordinary gasolene will meet every requirement and leave the stock in the most desirable condition.

Of course, to conduct this business on a paying scale outside of the mills it will be necessary for wool growers or dealers or others largely interested in the raw wool business to unite and form an association, the object of which would be to erect properly equipped "scouring stations and depots," so that the work could be centralized as much as possible. The machines and all parts of the plant should be of the most modern construction and as nearly automatic as possible.

Briefly, the operation of such a plant would be to degrease the dry wool by means of petroleum gasolene, operating by circulating through the entire wool mass until it has dissolved from the stock all the soluble grease. Then an inert gas would be forced in to displace the gasolene, after which the wool would be given a passage through warm water contained in woolwashing machines of the ordinary type.

This sequence of events would be repeated without variation on all kinds of wool, as all would be treated exactly alike—a feature quite different from ordinary wool scouring, where the scour liquors have to be modified for almost every other batch of wool.

The plant would have to be supplied with a distilling plant for the recovery of the gasolene and the saving of the grease, which, after special though simple treatment, becomes at once a most valuable article of commerce.



The warm water scourings in the machines also contain the soluble potash bodies of the wool and are easily converted into a pure type of potash.

This general process of wool scouring, as is seen, is operated upon the principle of taking greases, etc., away from the wool, and is essentially the reverse of the common process. The complaint is occasionally heard that the solvent process leaves the stock harsh and brittle, but such is not the case. The chances of injury to the wool by this treatment are nil, while, on the other hand, when scouring with alkaline liquors there always exists a hidden danger in the alkalies present.

The reason why the solvent process has not made greater headway is due to two causes: One, its cost as applied to mills of average size, and it is to be doubted whether an economical plant of reasonable cost could be installed in the largest mills. On the other hand, there has always been a fear of fire, which when working with inflammable fluids in large quantities becomes quite dangerous, but with the modern safeguards such fears can be reduced to a minimum.—*Textile World-Record*.

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#### DYEING LINEN WITH PRIMULINE.

This dyestuff has been used for the production of a large number of shades upon almost all fibres, but it is of special interest for the dyeing of yellows upon linen. Bleached linen always yields the very best results, but attention should be given to the bleaching process used, so that the maximum brilliancy or lustre of the fibres will be brought out and also that they shall not be weakened or tendered in any way.

When ordinary full shades are desired the dyebath may be made up with

2 to 2½ per cent. Primuline,

25 per cent. Common Salt,

and dyeing at the boil. The yarn is dyed quite evenly and

the shade obtained is of a peculiarly pleasing greenish tone, which is not, however, remarkable for its general fastness, being materially altered by light, alkalies, acids, etc.

A curious mode of aftertreating direct dyed Primuline is as follows: Dye as above described and then pass the yarn through an ordinary diazotizing bath prepared with

2½ per cent. Nitrite of Soda.

7½ per cent. Hydrochloric Acid.

Immersion in this bath lasts for fifteen to twenty minutes, when it is lifted, washed well in cold water and immediately worked in a fresh bath made up with

5 per cent. Ammonia Water 21° Be,

and heated to about 95° F. Here the yarn is regularly turned for twenty to thirty minutes, after which it is lifted, washed and dried, yielding a yellow that is very fast to ordinary washing and soaping and resists exposure to light very well.

Another method of treating a direct dyed Primuline is to work the yarn for an hour in a bath heated to 100° F., and containing about 10 per cent. of bleaching liquor (Sodium Hypochlorite standing at 10° Tw). At the completion of this treatment lift, wash well so as to remove all traces of chlorine, and dry. The resulting shade is remarkably fast to all ordinary influences, it being not appreciably affected by air, light, moisture, acids or alkalies. The shade obtained from about 2 to 2½ per cent. of Primuline and treated as described will be a full gold yellow.—*Textile World Record*.

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#### PROCESS OF REDUCING THE AMOUNT OF WEIGHTING IN SILK.

The method for weighting silk for white or colors now in general use consists in treating successively with perchloride of tin, sodium phosphate and sodium silicate. In some cases a bath of aluminum sulphate is added. This process not only preserves the brilliancy and feel of the silk, but even increases

it. Unfortunately, it is not possible to regulate the amount of weight obtained, and this may vary from 20 to 30 per cent. when every precaution is taken to work under constant conditions. It does not appear to depend on the variation of the silk fibre, as differences arise with fibres which are practically identical.

Under these circumstances it is necessary to have some way of reducing the weighting either partially or entirely, if necessary. A boiling soap bath will reduce it 10 to 12 per cent., but by dissolving the fibroin and not the metallic charge. Therefore this method is not advisable. The author has discovered that by the use of hydrofluoric or oxalic acids the weighting may be completely removed and the elasticity and strength of the fibre restored. This happens even with old, brittle silks, so that these may be restored to their original condition and re-weighted and redyed.

The process is simple, the silk is wet out and worked for a short time in a cold bath of dilute hydrofluoric acid, 4-10 to 1 per cent. solution is strong enough, washed and brightened. The reduction of the weight depends on the strength of the solution and the time of working. Therefore, it is possible to remove either a small percentage or the total weighting of the silk as may be desired. If oxalic acid is used the process requires the use of a cold saturated solution.—A. Mueller and H. Zell in *"Zeitschrift fuer Faerben und Textile Chemie."*

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### STUDY ON SILK MORDANTING.

By P. Heermann.

The mordants considered were those of tin, iron, chromium and aluminum. After mordanting, the samples were wrung out uniformly, washed, passed through water slightly alkaline with ammonia to neutralize the acid still remaining, and finally thoroughly washed.

The results of this study on the time used in mordanting

and the quantity of mordant fixed on the fibre can be summed up as follows:

The increase in weight of the silk, either raw or boiled off, due to the deposit of the mordant in a certain time attains a maximum, after which the weight decreases. This maximum occurs after a period of time varying from six hours to two days.

The loss in weight following the maximum is not due to a separation of the mordant, but to a loss of the fibre itself. With mordants of tin and aluminum, the boiled off silk does not absorb any more of the mordant after the greatest weight is reached, but the raw silk, after saturation, continues to attract the mordant perceptibly, but this changes the entire appearance, as the fibre becomes white without brilliancy.

The salts of chrome and iron react in the same manner, the maximum fixed weight having been reached, it does not vary. The raw silk differs very little from the boiled off, but the corresponding weights of the latter are about half of the former. After the fibre is saturated a longer mordanting is without effect. Of the four mordants included in the test, chromium acts the slowest.

The author has also studied the influence of the temperature on the quantity of mordant deposited. These mordants are attracted less at the freezing point of water than at the ordinary temperature of the workroom. This rule does not apply to all mordants. Some are attracted regularly in increasing proportions from 32-150° F., others show a certain increase from 32-60°, but none between 60 and 120°. The tests were made in 9° steps, from 32-86°.

The four mordants, tin, chrome, iron and aluminum, were used at 32° Be. concentration. For the first and second, 30°; for the third, 20°, and 10° for the last.

The silk skeins were washed in water for three minutes, then let stand in water for fifteen minutes, then with water slightly alkaline and with ammonia for fifteen minutes longer. After drying, they were wet out in cold water, wrung and mordanted

for six hours at the various temperatures; afterward wrung out, washed with water and dried at ordinary temperatures and weighed three days afterward.

The weight of raw silk with the tin mordant increases from 32-86°.

The observations at freezing and low temperatures are difficult, for the reason that the fibre does not wet out easily and the mordant is of an oily consistency.

To conclude, the influence of the temperature on the operation of mordanting is considerable in the case of raw silk, but with boiled-off silk it need not be considered.

Iron mordants react very much the same as tin.

The proportions absorbed by the raw silk vary from 4.92 to 7.85 per cent, when the temperature rises from 32-86°, but with the boiled-off silk the amount of fixed mordant is constant and independent of the temperature.

In the case of chromium mordants, the proportions of mordant fixed are reversed, compared with those of iron and tin.

The temperature is without influence on raw silk, but in the case of boiled-off silk the quantities vary from 4.3 to 5.83 when the temperature is raised.

With aluminum mordants, the two silks are practically the same, and the quantity of mordant increases with the temperature from 32-70, but further rise does not increase the amount of mordant.

These results indicate that the temperature has an influence on the quantity of mordant absorbed.

Certain mordants of zinc and iron, with certain fibres, as boiled-off silk, are fixed in equal quantities at ordinary temperatures, and these amounts vary in the case of other fibres, as raw silk. Other mordants, as chromium, react in the reverse manner, and some, as in the case of aluminum, show no difference with the various fibres.—*Faerber Zeitung*.

## TITANIUM SALTS AS SILK MORDANTS.

Recently Messrs. Peter Spence & Sons, of Manchester, England, have found that the double salts of titanium and the alkali metals can be easily made and successfully used as mordants. Their salts which the author tested were tanno-oxalate of titanium, sulphate of titanium and sodium, oxalate of titanium and potassium, and titanous chloride.

I. TITANIUM TANNO-OXALATE is a brown liquid which, mixed with water, after a time deposits a light sediment. A 5 per cent. solution at ordinary temperature was used. The silk absorbed this mordant rapidly and acquired a fine yellow color, the saturation was complete in four hours, while aluminum and chromium require from ten to twelve. The yellow so obtained is fast to washing and probably to light. The increase in weight of the silk varied from 2.3 to 4.2 per cent.

The shades yielded by this mordant when the silk was dyed with various dyestuffs were:

Persian Berries, orange brown.  
 Logwood, bronze green to greenish black.  
 Brazil Wood, dull red.  
 Fustic, olive yellow.  
 Anthracine Brown R, bright orange brown.  
 Alizarine, dull red.  
 Alizarine Black W R, blackish brown.  
 Galleine, brown violet, to dark violet.  
 Alizarine Blue S R, violet brown.  
 Alizarine Orange R, fine scarlet.  
 Alizarine Cyanine Green, fine dark green.  
 Alizarine Bordeaux R, fine maroon shade.  
 Alizarine Viridine F F, fine green.  
 Alizarine Azo Yellow, fine yellow.  
 Chrome Brown, dark red.  
 Dioxine, olive bronze.  
 Gambine R, olive yellow.  
 Solid Green, brownish olive.

II. THE TITANIUM AND POTASSIUM OXALATE is a white crystalline salt slowly soluble in cold water and little more easily in hot; the solution does not give a sediment on heating. A 5 per cent. solution is used and the silk is saturated in three to five hours. After mordanting it is better to pass the silk through a 5 per cent. solution of calcium acetate. The fibre then absorbs both titanium and calcium. Under these conditions the increase in weight amounts to 7 per cent.

III. TITANOUS CHLORIDE is a violet liquid containing 20 per cent. of the dry salt which mixes easily with water. After immersion for three to five hours in a 5 per cent. solution the silk is colored a pale gray. After this treatment it is advantageous to pass it through a 5 per cent. solution of sodium phosphate. The weight is increased 3 per cent.

IV. TITANIUM AND SODIUM SULPHATE is a white amorphous salt, soluble with difficulty in water. A 5 per cent. solution is used, and after mordanting the silk is treated with calcium acetate. There is little increase in weight.

If the silk is treated with tannin and then fixed with the oxalate or double sulphate the increase in weight amounts to 11 to 12 per cent. These three salts give practically the same results with the following dyestuffs:

Tannin, full yellow.

Persian Berries, dull orange.

Brazil Wood, dull brick-red.

Fustic, olive yellow.

Logwood, violet brown.

Weld, bright yellow.

Chrome Yellow R, fine yellow.

Alizarine, fine red.

Anthracene Brown R, fine brown.

Alizarine Orange R, orange scarlet.

Galleine, fine violet.

Acid Alizarine Blue B B, dark violet.

Alizarine Yellow N, deep golden yellow.

Coeruleine B, dull green.

Gambine B, moss green.  
 Gallocyanine F, dull violet.  
 Alizarine Maroon, deep maroon.  
 Chromocyanine V, deep violet.  
 Alizarine Green P B, dark bronze green.  
 Alizarine Blue A, dark reddish blue.  
 Alizarine Brown G, fine red brown.  
 Alizarine Cyanine Green, fine green.  
 Alizarine Bordeaux B, brownish red.  
 Alizarine Heliotrope B B, deep violet brown.  
 Anthracene Yellow C, deep golden yellow.  
 Acid Alizarine Brown B, dark brown.  
 Anthracene Chrome Red A, violet brown.  
 Alizarine Saphirol B, fine blue.  
 Alizarine Blue Black 3 B, reddish blue black.  
 Alizarine Red S, dark red.  
 Wool Yellow, fine gold yellow.  
 Cyanthrol R A, fine blue violet.  
 Brilliant Anthazural, bright blue.  
 Alizarine Coelestol R, deep navy blue.  
 Anthraquinone Violet, red violet.  
 Anthraquinone Blue S R, dark blue.  
 Cyanthrol R, reddish blue.

Titanium salts can also be used with advantage for the after treatment of "chrome developing colors." For this the oxalate or double sulphate is best, as the chloride reduces the azo colors and the tanno-oxalate changes the shade too much.

According to the author, the colors from the titanium mordants on silk are fast to soap and do not impair the brilliancy of the fibre like those from chromium or aluminum.—G. H. Hurst in "*Journal Society Dyers and Colorists*."

#### THIOGENE BLUE B.

This is one of the most important members of the Thiogene group. It produces full bright shades resembling indigo on all kinds of vegetable fibres.



Thiogene Blue B is dissolved in boiling water with about twice its weight of sodium sulphide crystals. The solution, which should appear claret-red, is added to the hot dyebath which contains the sodium carbonate and caustic. If the solution appears brownish blue more sulphide is required. Then the necessary amount of salt or Glauber's salt is added, the dyebath boiled up, the steam is then turned off and the material entered. The goods are worked for one hour at 160° to 200° F., then squeezed or hydroextracted, and the color developed by hanging in the air for one to two hours or by steaming with air for three-quarters to one-half hour. They are then well rinsed.

An after treatment with metallic salts, while not necessary, increases the fastness to alkalies, and can be used where the blue is combined with other colors for the production of compound shades. The use of standing kettles is advantageous, as the quantities of dyestuff and assistants can be reduced about 35 per cent. from the first bath. In dyeing, the material as far as possible must be kept below the surface of the dyebath.

The shades produced by this color are fast to washing, milling, light, boiling in acid and soda, but are not fast to bleach. It is recommended for dyeing raw cotton, yarns, piece goods either in the open kettle or in dyeing machines. It may be combined with the other Thiogene and Melanogen colors, and a great variety of shades can be obtained.

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#### THIOGENE DARK BLUES B and B T.

These new members of the Thiogene group are products which give fuller and darker blues than Thiogene Blue B. They are suitable for the production of fast medium to dark blue shades on cotton and linen yarn, piece goods and raw stock.

On account of their solubility they can be used in dyeing machines and in dyeing on the jigger, the lists of the pieces do not bronze.

They may be used in combination with the other Thiogene colors for making compound shades.

**Method of Dyeing.**—The dyestuff is dissolved with one and one-half times its weight of sodium sulphide crystals in hot water and the solution added to the dyebath, in which for 100 pounds material six pounds of 58 per cent. of soda ash and four pounds caustic soda solution 40° Be. have been boiled up. Last, the necessary quantity of salt or Glauber's salt is added. The proportion of the latter depends on the size of the dyebath and is necessarily greater in skein dyeing than when dyeing machines are used.

The different kinds of material are all dyed for one hour near the boiling point. After dyeing, the material is squeezed out and rolled evenly or whizzed out and the color developed by "smothering" for some time in boxes or by steaming for one-half hour in the presence of air. This changes the shade from a dark bluish gray to a deep blue. After oxidizing the goods are thoroughly washed, and if possible the first wash bath is heated to 160° F.

The quantity of dyestuff in standing kettles can be reduced about one-third, that of the soda and caustic about two-thirds, and the additional amount of salt required is very small. The proportion of sulphide depends upon the exposure of the bath to the air, yarn or jigger dyeing requiring much more than inclosed machines.

**RAW COTTON** is dyed in wood or iron kettles by boiling out thoroughly for one-half hour, and is allowed to simmer for another half hour. It is then thrown out, extracted and let stand on racks or in baskets for several hours or over night. By this treatment the color is fully developed. With proper precautions the development may be carried out by steaming for one-half hour in the necessary apparatus.

**YARN** is dyed in kettles, if possible keeping the yarn under

the dye liquor, and quick and even wringing from the dye bath is indispensable for level colors. In this case the color is best developed by steaming.

PIECE GOODS may be dyed in a continuous roll box with one or two runs of four to ten minutes, being squeezed out after each run, or on a jigger, but with this a suitable squeeze roll must be arranged for running the goods from the dyebath. The color is developed by the usual air steaming. This can be done in a box like printed material or the pieces can be run on perforated rolls and steamed from the outside.

The shades produced by these dyestuffs are fast to washing, fulling, light, acids and soda, but have little resistance to the action of chlorine bleach.

Thiogene Blues B and B T give clear white discharges. They are recommended for dyeing medium and dark blue shades on all kinds of material, and a full line of bright to very heavy blues may be obtained by combinations of them with Thiogene Blue B for the bright shades and Thiogene Blacks for heavy shades.

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#### THIOGENE BLACKS N A, N B and T.

These new blacks belonging to the Thiogene group of dyestuffs are like the others, easy of application, on account of their solubility and absence of superficial oxidation. These blacks do not bronze in dyeing, and when used for piece dyeing the lists of the goods remain clear. They may be used for dyeing raw cotton, yarns or piece goods either in open kettles or machines.

**Dyeing Method.**—The dyestuff is dissolved in hot water with the soda and sodium sulphide, and the solution added to the dyebath in which the salt or glauber salt has been dissolved. The bath is then heated to a boil, the steam shut off, the material is entered and worked for one hour at 185° to 200° F. After dyeing the goods are well squeezed, returning

the waste liquor to the dye kettle and washed. While the direct dyeings are remarkably fast, an aftertreatment with

2½ per cent. Copper Sulphate,

2½ per cent. Bichromate,

2 per cent. Acetic Acid,.

for one-half hour, at 140° F. increases the fastness to boiling soda solutions, especially in the case of the NA mark.

The proportions of dyestuff and assistants in new and old baths for the various materials follow:

		Dyestuff	Sodium Sulphide	Soda	Soda lye 48% Tw.	Common Salt	Glauber's Salt	Concentration
<b>Loose Cotton</b>	First Bath	% 20	% 20-30	% 10	% 2	% 50	%	1 : 15
	Old baths	10-12	10-15	4	1	0-5		
<b>Cotton Yarn</b>	First Bath	20	20-30	10	2	50		1 : 15
	Old baths	10-12	10-15	2	1	0-5		
<b>Mercerized Cotton Yarn</b>	First Bath	15	15-25	8	2	30	0-5 or	1 : 15
	Old baths	7½-9	8-12	2	1	0-3	0-5	
<b>Linen Yarn</b>	First Bath	12	12-20	6		30		1 : 15
	Old baths	8-9	8-12	2		0-3		
<b>Cops Dyeing</b>	First Bath	20	20-30	1	2		30 prts. p. 1000	1:6-1:10 accord'g to apparat.
	Old baths	10-12	10-15	2	1		0	
<b>Warp Dyeing</b>	First Bath	20	20-30	8	2	20 prts. p. 1000	40 prts. p. 1000	1 : 5
	Old baths	10-12	10-15	2	½	parts 0-2%	parts 0-4%	
<b>Pieces (Jigger Dyeing)</b>	First Bath	20	20-30	6	2	20 prts. p. 1000	40 prts. p. 1000	1 : 5
	Old baths	12-14	10-15	2	½	parts 0-2%	parts 0-4%	to 1 : 3

When dyeing mercerized material it is advisable to add to the first bath 2 per cent. Turkey Red Oil (or ¼ per cent. to old baths), which will preserve the lustre.

The quantities of salt given in the above table for old baths are regulated by the loss of the dye liquid. It is advisable, however, to control the concentration of the bath now and then by twaddling; it ought not to show more than 9° Tw.

With these three marks of black it is possible to produce any desired shade. Thiogene Black T gives a jet black, and is suitable for producing heavy cheap shades. Thiogene Black N A gives a clear bright shade, while Thiogene Black N B gives a full blue-black, and may be used in combination with Thiogene Blues for dark blues.

These blacks are recommended for all kinds of vegetable fibres, as the shades produced by them are fast to washing, milling, light and boiling in acids and soda.

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#### THIOGENE BROWNS, G C, G R and G 2 R.

These additions to the group of Thiogene colors are easily soluble level dyeing, and the shades produced by them do not require any aftertreatment with metallic salts.

They may be used in combination with the other Thiogene colors and the Melanogens for the production of fancy shades.

In practical use for solution these dyestuffs require half their weight of sodium sulphide crystals and one-third their weight of 58 per cent. alkali. The usual amount of common salt is used in the dye bath. The operation of dyeing is continued for one hour at 175° to 195° F., the material being entered hot. After dyeing the goods are well rinsed and dried. As these colors do not oxidize no special precautions are necessary, cotton yarn being dyed in the ordinary kettle and piece goods in the jigger without bronzing. However, the presence of copper in the dye bath must be avoided.

In combinations with other dyestuffs when an aftertreatment is needed these colors may be used, as the metallic salts only increase their fastness.

As regards fastness, their resistance to washing, milling,

boiling in soda and acid is excellent, and when aftertreated with copper salts they are remarkably fast to light. But they are unfavorably affected by chlorine.

### THIOGENE BROWN S.

This one of the well-known Thiogene browns yields heavy darkbrown shades which have the advantage like the marks CC, G&R and G2R of not requiring aftertreatment with metallic salts, as the direct shades are fast to washing and light. However, if they are treated with copper sulphate or copper sulphate and potassium bichromate, the fastness to light and boiling soda leaves nothing to be desired.

This dyestuff may be used in combination with the other Thiogene colors, as blacks, blues or browns and with the Melanogen group for the production of a full line of compound shades.

**METHOD OF DYEING.**—The dyestuff with one-half to an equal quantity of sodium sulphide is dissolved in boiling water and added to the dyebath in which for 100 pounds material three to four pounds dry sodium carbonate (58 per cent. alkali) and twenty to thirty pounds of salt or a proportionate amount of Glauber's salt have been dissolved, and the whole boiled for a short time. The method of treatment is then varied for the different kinds of material.

**RAW COTTON** is entered in the boiling bath, thoroughly wet out by hard boiling for one-quarter hour and then allowed to boil easily three-quarter hour longer.

**FOR YARN**, after the kettle is boiled the steam is shut off, the yarn entered, given five turns, and stands ten minutes, and this is repeated until the shade is correct. The time should be from three-quarters to one hour according to shade.

**PIECE DYEING** on the jigger gives good results. The dyestuff solution is fed during two ends and a medium weight roll (about 120 pounds) can be dyed in ten runs with slow boiling. In jigger dyeing with a very short bath and wet goods, the addition of salt to the dyebath may be omitted.

IN MACHINE DYEING, the solution of the dyestuff is filtered before using, and the addition of salt is regulated by the amount of dye-liquor. The temperature is kept near the boiling point.

Thiogene Brown S dyes level without special precautions. Yarn may be dyed in the ordinary way, and the lists of pieces dyed on the jigger do not bronze. As the shade is little influenced by heat, matching to sample with this color is comparatively easy.

With all kinds of material, a thorough washing is essential. On this account the material should be squeezed out or hydro-extracted directly from the dye kettle. In this way the dye-bath may be saved, the process of washing shortened and the danger of crocking avoided.

Thiogene Brown S is recommended for dyeing all kinds of cotton and linen material, whether raw stock, yarn, piecegoods, cops, etc., either by itself or in combination with the other Thiogene colors.

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#### MELANOGEN BLUE B G Pat.

This is a new member of the Melanogen group which differs from Melanogen Blue B in yielding a greener shade of blue. This, like the B mark, can be dyed in ordinary dye kettles of wood or iron with no more precaution than with ordinary direct colors.

For yarn the method follows:

2 to 8 per cent. Dyestuff.

2 to 8 per cent. Sodium Carbonate (58 per cent. alkali.)

10 to 40 per cent. Salt.

First the dyestuff is dissolved in hot water with half the quantity of soda. The dye-bath is heated to 195° F. and half of the salt and the remainder of the soda added to it, and after this half of the dyestuff solution. The yarn is entered, given five turns and the rest of the dyestuff solution fed on. Then after five more turns the remainder of the salt is added,

and the dyeing finished in one-half to three-quarter hour. The temperature of the dyebath should be kept at 190° to 200° F. The yarn is well washed and fixed as usual by treatment by some metallic salt, such as Fixing Salt, Copper or Zinc Sulphate, etc. For this purpose a fresh bath is used with 2 to 5 per cent. of the necessary salt and 2 per cent. of acetic acid. The yarn is worked one-quarter hour cold, the temperature raised to 125° F. during one-quarter hour and then the yarn is well washed. The shade may be brightened by the addition of basic colors to this bath. The method is the same as for the other Melanogens.

This blue is recommended for yarns, raw cotton and piece-goods and especially for machine dyeing on account of its dyeing perfectly level and not bronzing with the ordinary methods in use.

#### BLACK ON HOSIERY.

A Sulphur Black on hosiery, which has lately been recommended, is dyed with Thiogene Black N A in the following proportions, for 100 pounds stockings:

	First Kettle.	Second Kettle.	Third and Standing Kettle.
Thiogene Black N A.....	18 lbs.	14 lbs.	12 lbs.
Sodium Sulphide Cryst.....	27 "	14 "	12 "
Calcined Soda .....	9 "	5 "	3 "
Calcined Glauber's Salt.....	50 "	10 "	5 "

The goods are dyed for one hour just below the boiling point and then washed once with water at a temperature of 100° F. and finally with cold water. They are then treated with the following finish. For 1,000 parts of bath use:

- 2 parts Olive Oil.
- $\frac{1}{2}$  part Soda.
- $\frac{1}{2}$  part Marselles Soap.
- $1\frac{1}{2}$  parts Starch.

Work in this for ten minutes, squeeze and dry. Hosiery dyed



with this color is less liable to change on storing than when colored with an oxidized black.

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**DIANIL DEEP BLACKS, F F CONC, T V CONC and  
B R EXT. CONC.**

These new marks of Dianil Blacks yield heavy shades of black suitable for all kinds of cotton and linen material.

They are dyed in the usual way with salt or Glauber's salt in boiling bath. They compare favorably with the other blacks on the market in regard to fastness. By an after treatment with sulphate of copper and bichromate of potash the fastness to light is increased, and the shade becomes bluer. On this account they may be used as a ground for aniline black.

Development with azophor gives a heavy shade and increases the fastness to fulling.

They are recommended for all kinds of work where cheap, heavy shades of black with moderate fastness are desired.

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**AMIDO FAST BLACK  
FOR YARN DYEING.**

For some time yarn dyers have been looking for a perfectly fast black for fine yarns which would compare favorably in shade with the oxidation aniline black and be without the great disadvantage of the latter—the weakening of the fibre. This has been rendered possible by the introduction of the process of dyeing black by means of Amido Black Base I., and the following formula has been found to give a positively nongreenable black of fine shade without injuring the finest count of yarn:

A	{	Tragacanth solution 6-100.....	100	parts
		Water.....	225	"
	{	Amido Black Base I.....	30	"
		Acetic Acid 8° Br. ....	100	"
		Lactic Acid 50%.....	40	"
		Aniline Oil CI.....	5	"
B	{	Sodium Chlorate 1-3 Water.....	75	"
		Aluminum Chloride 30° Bi. ....	15	"
		Water.....	400	"
		Cerium Chloride 20%.....	10	"

The dye liquor is prepared by dissolving the Amido Black Base in the acetic and lactic acids and the solution stirred in with the water, tragacanth and aniline oil. The solutions of chlorate, aluminum chloride and cero chloride are mixed with the water, and, after cooling, the two solutions, A and B, are mixed together and made up to 1,000 parts.

In dyeing, a small tub, holding two gallons of this liquor, is used, and the yarn, in small lots of about two pounds each, is saturated with the liquor. It is not necessary to boil out the yarn, as the solution wets it very easily. After the yarn is thoroughly wet it is wrung out evenly or extracted not too dry, and the liquor returned to the tub. As each lot is put through, fresh dye liquor must be added.

After the yarn is wrung out or extracted it is hung on clean sticks and dried at 140° F. It is then steamed two to three minutes without pressure, washed and soaped. If it is not convenient to steam, three-quarters of a part of copper chloride solution may be added to the above proportions, and then the black can be developed by merely drying at 140° F. The black obtained in this way is not so fast to rubbing as the one which is steamed, but in other respects the result is the same.

Amido Fast Black is fast to soap and soda, acid and perspiration, and stands fulling, light and sulphur. It is absolutely

nongreenable, and does not tender the fibre. Only as regards chlorine bleach is it less fast than oxidation aniline black.

It is recommended for all kinds of fast black yarn work.

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### AZO ROSE B B.

This is a new insoluble azo color, which is developed on the fibre prepared with beta-naphthol. This gives in heavy shades a very brilliant scarlet red, and in light shades a bluish-pink of great purity. The base is the hydrochloride of a complex amido body which is very stable if not exposed to the action of heat and moisture.

As on account of the slight basicity of this product, it is possible to decompose the salt by dissolving in hot water, the best method of diazotizing is to stir the base together with the cold water and hydrochloric acid and add the ice. Then the nitrite is slowly added, with constant stirring. This method avoids the formation of decomposition products, and it is further to be observed that the diazo body will crystallize out from cold concentrated solutions. After diazotizing the diazo solution is diluted and strained, and before using the excess of mineral acid is neutralized with sodium acetate.

The formulas follow:

#### GROUNDING.

Beta-naphthol .....	16 parts.
Caustic Soda solution, 22° Be.....	32 "
Para Soap .....	20 "
<hr/>	
Water to make.....	1.000 parts.

## DIAZO SOLUTION.

Azo Rose Base B B.....	26 parts.
Cold Water.....	72 "
Hydrochloric Acid, 22° Be.....	26 "
Stir well together, add	
Ice .....	100 "
Water .....	200 "
Add slowly with constant stirring	
Nitrite solution, 290-1000.....	26 "
<hr/>	
Let stand and make up to.....	500 parts.
Strain.	

## DYE LIQUOR.

Diazo solution .....	500 parts.
Water, cold .....	500 "
Sodium Acetate .....	40 "
<hr/>	
To make .....	1,000 parts.

## RED PRINT COLOR.

Diazo solution .....	500 parts.
Gum Tragacanth solution, 6-100.....	500 "
Sodium Acetate .....	40 "
<hr/>	
To make .....	500 parts.

## PINK PRINT COLOR.

Diazo solution .....	60 parts.
Gum Tragacanth solution, 6-100.....	500 "
Acetic Acid, 8° Be.....	50 "
Water .....	380 "
Sodium Acetate .....	10 "
<hr/>	
To make .....	1,000 "

## WHITE RESIST.

Thickening S G.....	500 parts.
Tin Crystals (Stannous).....	200 "
Acetic Acid, 8° Be.....	100 "
Water .....	200 "

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To make ..... 1,000 "

## THICKENING S G.

{ China Clay .....	65 parts.
{ Water .....	100 "
{ Wheat Starch .....	130 "
{ Water .....	180 "
Gum .....	280 "
White Beeswax .....	15 "
Boll, cool, and when milk warm add	
Petroleum .....	10 "

The method of application is the same as other insoluble azo colors. The white resist with tin salt is the only one which so far gives any result. Nothing satisfactory has been obtained from sulphite resist or hydrosulphite discharge.

The fastness of this color is satisfactory even in full shades, and its use should be as general as that of the other colors developed on the fibre.

## AZOPHOR BLACK D P.

This is a product the use of which is similar to that of Azophor Black S, the production of blacks on Beta-naphthol grounding.

It is a brown powder easily soluble in water, but, like other azophor bodies, sensitive to the action of heat, light and moisture.

The shades produced by this black are fast to washing and light, and, owing to the uniformity of the color, not varied

considerably by the depth of the engraving of the print roller.  
It may be used with the usual resist colors.

The following formulas are recommended:

#### NAPTHOL GROUNDING.

25 parts	Beta-naphtol R
50 "	Caustic Soda 66,4° Tw.
25 "	Parasoap P N.

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1,000 parts.

#### BLACK PRINTING PASTE.

{ 100 parts	Azophor Black D P pat. dissolved in
{ 400 "	Water, are thickened with
440 "	Flour Tragacanth, thickened before using.
60 "	Acetate of Soda are added.

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1,000 parts.

#### WHITE RESIST.

300 parts	British Gum.
700 "	Potassium Sulphite 90,6° Tw.

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1,000 parts.

Slightly heated.

#### FLOUR TRAGACANTH-THICKENING.

2,100 parts	Wheat starch.
4,500 "	Water.
3,000 "	Tragacanth 60:1000.
450 "	Acetic Acid 12° Tw.

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Boiled.

**PARA BROWNS R and G.**

(Pat. applied for.)

The usual insoluble azo browns developed on the fibre have all failed to meet the requirements of the market in regard to fastness to soap, acid and light. Now the Farbwerke-Hoechst have succeeded in overcoming the difficulties, and have introduced two new azo browns produced by combining diazotized paranitraniline with Brown Salt R and Brown Salt G. The resulting shades are fast to soaping acids, soda and bleach. These browns can be combined with each other, and may be discharged pure white with hydrosulphite discharge.

**METHOD OF APPLICATION.**—The bleached cotton goods are padded with cold solutions of the brown salts which contain some acetic acid and gum to avoid bronzing. The material is then dried in the hot flue or over cylinders and passed through the solution of diazotized paranitraniline. The pieces are then washed, soaped, washed again and dried.

The formulas follow:

Brown Salt R or G.....	15 parts.
Acetic Acid 12° Tw.....	30 parts.
Hot Water.....	485 parts.
Tragacanth 60-1000.....	50 parts.
Cold Water.....	420 parts.

To Make..... 1,000 parts.

**DEVELOPING BATH.**

14 parts	Paranitraniline extra are dissolved in
60 "	Boiling Water and
22 "	Muriatic Acid 36° Tw.; then cooled whilst stirring continuously till Paranitraniline is precipitated in very fine subdivision. Then
100 "	Ice are added and at 32° F.
26 "	Nitrite solution (290 to 1,000). After stirring the solution if filtered and before use
30 "	Acetate of Soda cryst, are added.
<hr/> 1,000 parts.	

**A NEW BROWN FOR PRINTING.**

A brown that has been recommended for piece dyeing is dyed as follows: The goods are first dyed with Dianil Black C R, then grounded with betanaphthol as usual and developed with paranitraniline. The advantage of this brown is that it yields perfect white and brilliant colored discharges with hydrosulphites.

**ANILINE BLACK FROM ANILINE FORMATE.**

FOR PRINTING the following recipe is given in a recent patent as a suitable example: One hundred and twenty grams wheaten starch, fifty grams dextrine, and forty-five grams chlorate of soda are dissolved in six hundred grams of water. To the cooled thickened resulting mass add twenty-five grams of nitrate of copper dissolved in fifteen grams of water, one hundred grams of aniline and two hundred grams of formic acid (26 per cent. strong).

The printing, steaming, etc., are carried out in the usual manner.

FOR SILK AND COTTON.—Forty grams chlorate of potash, twenty grams sal-ammoniac, twenty-five grams nitrate of copper are dissolved in seven hundred grams of water, and after cooling add to this solution one hundred grams of aniline and two hundred grams of formic acid (of the strength of 26 per cent.). The fabric is impregnated with this bath and is further treated in the usual manner. The same bath is also suitable for hanks of cotton yarn, which after impregnation are oxidized by hanging in the usual manner.

**AMIDO FAST BLACK.****PRINTING ON YARN.**

Having the advantages of being absolutely non-greenable and not tendering the cotton fibre, this black is especially suitable for printing cotton yarn. The method of application



is much simpler than that for aniline black, and the resulting color is fast to light, soap, soda and acids.

In the preparation of the printing color two stock liquors should be made up. These will keep for several days without decomposition, while the mixed print color oxidizes quickly, and only enough for use within six hours should be made up at one time.

#### Stock Liquor A.

Amido Black Base I.....	30 parts.
Aniline Oil C I.....	5 "
Acetic Acid 50 per cent.....	100 "
Lactic Acid 50 per cent.....	40 "
Dissolve the amido black base and aniline oil in the warm acids, cool and stir in the mixture of	
Gum Tragacanth (6 parts to 100 water)...	100 "
Cold water .....	225 "
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To make .....	500 parts.

#### Stock Liquor B.

Sodium Chlorate .....	25 parts.
Dissolve in	
Water .....	100 "
Add	
Aluminum Chloride 30° Bè.....	15 "
Copper Chloride .....	2 "
Cold water .....	358 "
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To make .....	500 parts.

Before using mix together equal parts of A and B and strain.

The yarn is prepared for printing with the usual chloride of lime bleach, and should be thoroughly dried. If the yarn is mercerized, to prevent the running of the print color, it should be saturated with a mixture of dilute acetic acid and a small quantity of starch and then dried.

Print as usual and dry on cans or transfer to dry room with a temperature of 125° to 140° F. Then the yarn is allowed to hang at a temperature of 105° to 125° F. until the print is developed to a deep black. This takes from two to ten hours, according to the heat. In place of this slow process the black can be developed by steaming, but this method requires care. The yarn must not be packed tight in a small box, but must hang loose and open and the acid fumes must be carried off quickly so they cannot injure the strength of the fibre.

If the prints are used in half-wool mixtures which are over-dyed in an acid bath, the black must be developed with steam, otherwise the color is not sufficiently fast.

After the black is completely developed the yarn is ready for immediate use, but the shade is much bluer and finer if it is washed and soaped.

This black is recommended for all kinds of print work on yarns.

### FAST ACID VIOLETS BE, RBE, RGE

#### IN PRINTING.

On account of their fastness to light these violets are very suitable for printing wool pieces, tapestry and carpet yarns, and on account of their fastness to storing and milling for worsted yarn and Vigoureux printing. The colors are printed on chlorinated tin prepared material; steamed one hour with moist steam and washed.

#### PRINT COLOR.

Dyestuff .....	30 parts.
Water .....	410 "
Ammonia .....	10 "
British Gum Thickening.....	500 "
Oxalate of Ammonia.....	50 "
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1,000 parts.	

## BRITISH GUM THICKENING.

British Gum .....	250 parts.
Water .....	200 "
Glycerine .....	30 "
Turpentine .....	20 "
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500 parts.	

## ACID ALIZARINE BROWNS BB and T.

These are two new dyestuffs belonging to the well-known group of acid alizarine colors and have all their advantages. They are dyed with the addition to the dye-bath of

20 per cent. Glauber's Salt.

3 per cent. Oil of Vitriol.

The material is entered nearly at the boiled and boiled for one hour, then from

1 to 3 per cent. Bichromate

is added and the boiling continued one hour longer.

The BB mark is especially recommended on account of its fastness to milling and steaming. It does not bleed into white and stands carbonizing and storing. It may also be used for cross-dyed fancy effects.

In dyeing interwoven cotton threads are stained and the color therefore is not to be used for this variety of piece dyeing.

These colors are recommended for producing deep brown shades at a very low cost on all classes of material.

## AZO ACID RED B.

This is a strong level dyeing red dyestuff which on account of its low price should find wide use. It is dyed as usual with acid colors, with Glauber's salt and sulphuric acid. In shading if necessary additions may be made to the boiling bath. It may also be used for shading chrome developed colors, as bichromate does not affect the shade.

The shades from this color do not crock and are fast to

alkali light and water. They are not suitable for use where washing or milling with soap is employed. They stand light stoving and carbonizing without alteration. Tin crystals or zinc dust gives a white discharge.

Azo Acid Red B is recommended for dyeing light woollen or worsted piece goods and for fancy yarns either alone or in combination shades.

### FAST ACID VIOLETS BE, RBE and RGE.

For some years the Fast Acid Violets of the Farbwerke-Hoechst have been most favorably known to wool dyers on account of their desirable qualities. This same firm has brought out these new brands, which have one advantage over the older ones that the shades are much less changed by hot pressing and ironing.

These dyestuffs are dyed in the usual way with Glauber's salt and oil of vitriol. Shading may be done by additions to the boiling bath.

Interwoven white cotton is slightly stained and silk is dyed the same depth as wool. The shades produced by these colors are fast to water, washing, light and stoving. These fast acid violets are recommended for making combination shades in yarn and piece dyeing on account of their general qualities and especially the slight influence of heat on the shades.

### NEUTRAL BLUES R and 3R.

These new blue dyestuffs have the valuable property of dyeing either in a neutral or acid bath and, therefore, may be used in combination with acid colors for wool dyeing or with Dianil colors for half-wool union dyeing.

In acid dyeing they require the usual

5 per cent. Oil of Vitriol and

20 per cent. Glauber's Salt,

and give bright, clear level shades of blue. They are suitable for wool and piece goods, and may be used in combination with

Victoria Violet 4BS and Amido Naphthol Reds for making navy blue shades. They are also useful for the production of blue shades on shoddies. In this case the addition of chrome alum increases the fastness to fulling.

In a neutral salt bath they may be used in combination with the Dianil colors for dyeing both blues and compound shades on half wool material.

In the acid bath these blues exhaust well, but cotton, interwoven in pieces, is somewhat colored; silk is dyed as deep as the wool. As they are not affected by bichromates they are suitable for shading chrome developed colors. These blues equalize well, being similar to Patent Blue 'A' in this regard.

Light and medium shades of Neutral Blue R and 3R do not crock, but in heavy shades they smut slightly. They are faster to light than the ordinary acid violets and the R mark is not altered in artificial light while the 3R turns somewhat redder.

They stand hot drying, ironing and dry finishing, and may be carbonized with but slight change of the shade. They are also fast to stoving.

As regards fastness to water, washing and fulling they rank with ordinary acid colors. The fastness to alkali is satisfactory; they resist the influence of street dirt, ammonia, etc., while stronger alkalies, like soda and quick lime, make the shade lighter.

These colors are suitable for wool blotch printing, but cannot be discharged with tin salt discharge, and zinc dust discharge does not yield a pure white.

In silk dyeing Neutral Blue R and 3R may be used for producing bright blues comparatively fast to water and absolutely fast to sulphur.

#### PATENT MARINE BLUE LE.

This is an acid dyestuff which is suitable for the production of navy blue shades of more than ordinary fastness to light. It can be used in combination with other acid colors, and a

full range of medium and dark blues may be obtained. It is recommended for yarn and piece dyeing.

#### VICTORIA VIOLET 4BSL.

This resembles in shade the older Victoria Violet 4BS, but the shades obtained from it are much faster to light. It can be used in combination with other acid colors for producing navy blue shades of excellent fastness to light.

#### ACID ALIZARINE BLACKS SE and SET.

These blacks which are on the market in both paste and powder form are distinguished on account of their fastness and beauty of shade which does not change in artificial light.

The shades produced by these blacks leave nothing to be desired as regards fastness. The SE mark is faster to light than any other black dyestuff for wool. When properly dyed the shades will not bleed into white cotton wool or silk in fulling. Neither wet nor dry steaming affect them and they are not injured by roll-boiling. They are fast to acids and carbonizing, and in cross dyeing in an acid bath only a slight amount of color bleeds into the undyed wool, so they may be used in most overdyed mixtures. The blacks are perfectly fast to stoving. The blacks stand repeated washing with hot alkaline soap and hot pressing, ironing, perspiration, caustic lime and street dirt do not affect the shades.

There are several methods of dyeing which appear to give good results.

For general work:

The dyebath is prepared (according to the degree of hardness of the water) with 5—10 oz. of Oxalate of Ammonia per 100 gall. of liquid (viz. 1—2 per cent. of the weight of the material). Then, after stirring the bath, the dyestuff and 6—8 per cent. of Acetic Acid are added, the material entered and the temperature gradually raised to the boil. If after one hour's boiling the bath is nearly exhausted, the goods are boiled for an-

other one-half hour without any further addition of acid; but if the dyeliquid is not exhausted 2—4 per cent. of Acetic Acid are added and the boiling continued until the bath is clear.

Then 2—3 per cent. Bichromate are added and the black developed by boiling for three-quarters to one hour. After dyeing, the goods are well washed.

For heavy goods which dye through with difficulty 10—20 per cent. Glauber's salt are added at the commencement.

When dyeing slubbing, etc, in a mechanical apparatus (Obermayer, etc.) the material is boiled for one-half hour with dyestuff and Oxalate of Ammonia at first and the required acid is then gradually added. After having started with Acetic Acid, 1—2 per cent. of Oil of Vitriol may be used in order to exhaust the dyeliquid; or 4 per cent. of Oil of Vitriol may be used from the beginning; but the blacks thus obtained are not as bloomy and rich as those produced with Acetic Acid.

The chroming operation can be carried out in a separate bath. This is especially suitable for hair hat dyeing, for, on account of the great amount of dyestuff necessary for this purpose, the baths are not exhausted; but this process may likewise be resorted to with advantage, if the dyeing operation is carried on continuously for several lots. It is not advisable, however, to keep the baths longer than one day. When chroming off in a separate bath, 3 per cent. of Acetic Acid is added for the first lot.

For old dyebaths 1—2 ox. Oxalate of Ammonia per 100 gall. of water are sufficient.

The presence of copper does not affect the color.

FOR RAW WOOL, especially if it is dirty and contains lime, this method is advised. Make up the dyebath and add 2—3 per cent. of the weight of wool of Oxalic Acid, then add the dyestuff. Enter the wool at 140° and boil one and one-half hours. Add 2 to 3 per cent. of bichromate and boil to shade in one hour.

Another formula for general use is:

First add to the dyebath

2½ per cent. Glue,

3 per cent. Acetic Acid or 1 per cent. Oil of Vitriol,  
then the amount of dyestuff required.

Enter the material at 170° F. and boil one-half hour; then  
add 6 per cent. acetic acid or

3 per cent. Oil of Vitriol.

Boil one-half hour and develop with

2½ to 3 per cent. Bichromate.

Boil to shade in three-quarters of an hour.

This method is said to yield shades which are somewhat fuller and even faster than the other methods. The danger of bleeding from insufficient development is also lessened. As this is the cause of most of the complaints in chrome developed colors this is a positive advantage.

These blacks are recommended for yarns, loose wool, slubbing and piece goods which have to stand very severe treatment in finishing. For ordinary piece dyeing they are not so suitable as the Acid Alizarine Black R or A C, as interwoven cotton is stained and the goods require a heavy scouring after dyeing to avoid crocking, but for all other purposes these will be found the most satisfactory black dyestuffs on the market.

### NAKO COLORS.

These colors, which have been introduced by the Farbwerke vorm. Meister, Lucius and Bruening for fur dyeing, comprise:

Nako Yellow O.

Nako Brown P.

Nako Brown D.

Nako Red O.

Nako Black O.

They are applied to the fur in the usual manner, and by means of mixtures any desired shade of brown or black may be obtained.



### A NEW DISCHARGING AGENT.

For discharging Alphanaphthylamine Claret Red it has been found that ordinary agents do not give satisfactory results, but the Farbwerke vorm. Meister, Lucius and Bruening have brought out one under the name "Hydrosulphite Z," which gives excellent whites on this color.

Hydrosulphite Z is a gray paste which is very stable and homogeneous. In use it is mixed with gum and printed as usual. Six hundred parts hydrosulphite Z to four hundred gum solution gives good results.

After printing the goods are dried sharply and then steamed for 2 to 3 minutes in Mather Platt machine with dry steam. The goods are then washed, soaped and finally chlored, as the white effects of naphthylamine clarets turn yellow on storing if the pieces are not bleached after discharging.

### HYDROSULPHITE N F.

For some time the hydrosulphites of sodium, zinc, etc., have been prepared in a solid state and of almost absolute purity; but these salts have not been of practical use owing to their rapid decomposition by oxidation. However, the Farbwerke vorm. Meister Lucius and Bruening have now introduced stable hydrosulphites, of which the N F is an example.

Hydrosulphite N F is a solid, slowly hygroscopic, which dissolves readily in cold or warm water. The resulting solution of an alkaline reaction does not decolorize but very slowly in the cold a solution of indigo, but the decoloration takes place rapidly on heating. In the dry state or in aqueous solution the oxygen of the air does not oxidize it—the hydrosulphurous acid which it contains only becomes active in the presence of acids, free alkalis or bisulphites and on steaming.

This hydrosulphite can be used for indigo printing discharge work or wherever else the use of a powerful reducing agent is indicated. Some examples of its use and formulas follow:

## INDIGO PRINTING.

By means of a new alkaline indigo printing process with Hydrosulphite N F very light to very dark indigo shades are obtained on bleached unprepared cloth. Indigo M L B 20 per cent. is very profitably worked in this process, and likewise the bromated indigoes M L B | R paste and M L B | R R paste are suitable for our new method.

If naphtholated material is employed the Indigoblue can be combined with insoluble Azo Colors. In this case, however, as little oil ingredients as possible must be added to the Naphthol prepare. On Turkey Red ground beautiful blue discharges are obtained, while the alkaline Hydrosulphite paste—without Indigo—acts as a powerful white-discharge on Turkey Red.

The following particulars for carrying out this process are to be noted:

**PREPARING THE PRINTING PASTE.**—Hydrosulphite N F Hoechst is dissolved in hot water, the solution cooled and then added gradually to the alkaline thickening in a jacket-pan. To this, when properly cool, the Indigo paste is added. For dark shades British Gum is used for thickening. This must be free from starch, and when mixed with caustic soda must produce a clear, supple paste. Light shades, and also reduced colors, are thickened with best British gum or with gum Arabic. The most suitable strength of the caustic soda is 76° Tw. This permits of the Indigo being fully exhausted, without mercerizing the printed material too much. The printing pastes are very stable. Light colors are obtained by reducing the dark standard shades with alkaline gum thickening, to which is added a little Hydrosulphite N F and also some glycerine for equalizing purposes.

Light effects may also be obtained with printing pastes containing no alkali, but in this case the reducing agents are to be considerably increased.

With so-called Sulphur Resist Colors similar white effects are obtained under Steam Indigo blue to those produced by the Glucose process.

Acid agents such as Lactic Acid, Sulphate of Alumina, etc., enhance the efficacy of these Resists.

If, however, Red Prussiate is added, these Resists discharge or preserve the previously dyed Indigoblue only at those places where there is an imprint of alkaline Indigo printing color.

The printing operation is carried out in the usual manner; the consistency of the printing pastes depends upon the design and the depth of the engraving. Generally the colors ought to be as thin as possible. In two or multi-colored styles, with light Indigo blotch, it is advisable to employ two doctors for every roller, so as to avoid soiling the blotch with the other colors.

It is important that the printed goods are always dried evenly and perfectly before steaming.

The steaming operation is the most essential part, but it does not present any great difficulties with a suitable machine and if all the conditions and particulars are observed.

The Indigo is always properly reduced and most profitably worked if the following conditions are adhered to:

1. The goods must be dried evenly and not too quickly before entering the steaming apparatus.

2. The steaming operation is carried on for 2—3 min. in an atmosphere of hot steam (212—216° F.), which is free from air.

These conditions are easily observed if a suitable steamer is at hand. The use of an ordinary Mather-Platt quick steaming chamber, with slight alterations is recommended. This alteration not only permits of the application of this apparatus for the Indigo printing process, but also for discharging with Hydrosulphite N F Hoechst.

The steamer should be covered with non-conducting material and the steam should be passed through a dryer and if necessary a superheater, and superheated steam plates should be placed in the bottom of the box.

In order to keep the steamer free from air the steam should circulate actively and the slots for the entrance and exit of the goods should be as narrow as possible, and before the

prints are run through it is advisable to pass a cloth prepared with hydrosulphite through the steamer to absorb all traces of air. A suitable arrangement should be made for a thermometer in the interior, and the box should have glass windows for observing the goods during the passage. Immediately before entering the box the goods must be passed over drying cylinders so they will be properly heated.

The process differs from the alkaline glucose method in requiring dry live steam without moisture and a longer time in steaming.

The steam causes the Hydrosulphite N F to react on and reduce the indigo, and the printed places should appear brownish-yellow, and on leaving the steamer they should turn olive. Directly after steaming the goods are washed and finished. They are first passed through a full-width washer with a good supply of running water, which removes all the alkali without danger of staining the unprinted portions. The final oxidation of the indigo—white to blue—is carried out in the open washer, the goods during the passage being run so they are partly in the water and partly in air, while they are constantly sprayed. After the color is developed in this way there is no further danger of staining, and the pieces can be finally washed and soaped in the rope. If dried before soaping the prints will be darker. The formulas follow:

#### STEAM INDIGO BLUE F.

- { 150 parts Hydrosulphite N F Hoechst are dissolved in
- { 50 parts Hot water, then cooled down and added in several portions—while cooling—to
- 450 parts Alkaline British Gum Thickening 40. Then
- { 150 parts Indigo M L B 20 per cent. paste, mixed with
- { 200 parts Cold Alkaline British Gum Thickening 40, are added.

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1,000 parts.

## STEAM INDIGO BLUE F G

Is prepared like Steam Indigo Blue F, but instead of Alkaline British Gum Thickening 40, 650 parts Alkaline Gum Thickening 40 are used.

## STEAM INDIGO BLUE DISCHARGES F P R ON PARA RED.

- { 230 parts Hydrosulphite N F Hoechst are dissolved in
  - { 70 parts Hot water and added gradually, while cooling continually, to
  - 400 parts Alkaline British Gum Thickening 40. Then
  - { 150 parts Indigo M L B 20 per cent. paste, mixed with
  - { 150 parts Alkaline British Gum Thickening 40, are added.
- 
- 1,000 parts.

## STEAM INDIGO BLUE N F.

- { 75 parts Indigo M L B 20 per cent. paste
  - { 600 parts British Gum Thickening 1:1
  - { 200 parts Hydrosulphite N F Hoechst
  - { 125 parts Hot water.
- 

1,000 parts.

## STEAM INDIGO BLUE F R.

- { 75 parts Hydrosulphite N F Hoechst.
  - { 75 parts Water.
  - { 650 parts Alkaline Gum Thickening 40.
  - { 200 parts Indigo M L B | R 20 per cent. paste.
- 

1,000 parts.

## STEAM INDIGO BLUE F R R.

Is prepared in the same manner as Steam Indigo Blue F R, but 200 parts Indigo M L B | R R 20 per cent. paste are added instead of M L B | R.

ALKALINE BRITISH GUM THICKENING 40.

100 parts British Gum free from starch.

900 parts Soda lye 76° Tw.

---

Dissolve at 122-140° F. until the solution is perfectly clear.

ALKALINE GUM THICKENING 40.

600 parts Soda lye 100° Tw.

400 parts Gum solution 1:2 (gomme industrielle).

REDUCING PASTE A F.

400 parts Gum solution 1:2 (gomme industrielle).

500 parts Soda lye 76° Tw., add cold.

15 parts Glycerine.

10 parts Hydrosulphite N F Hoechst

75 parts Water.

---

1,000 parts.

REDUCING PASTE N F.

{ 100 parts Hydrosulphite N F Hoechst.  
300 parts Water.

600 parts British Gum 1:1.

---

1,000 parts.

DISCHARGE WORK.

WHITE DISCHARGES—The following dyestuffs give white discharges with Hydrosulphite N F.

ACID COLORS.

Yellow—Flavazines, S, L and T. Fast Yellow O.

Orange—Orange No. 2, Brilliant Orange.

Red—Scarlets 2R, 6R, Victoria Scarlets 2R, 3R, 4R, 6R.

Brilliant Croceines, blue shade and yellow shade.

Fast Red O, Amido Naphthol Reds G, 2B, 6B.

Azoacid Carmine B, Acid Magenta extra, O and M.

Scarlets for silk G and O, Azo Acid Red B.

Victoria Rubine, Brilliant Crimson, Chromotrop 6B.

Green—Naphthalene Green conc. V, Acid Green conc.

Black—Discharge Black NF.

Blues—Opal Blue, Methyl Blue for Silk, Water Blue O.

Alkali Blues O, 2B, 4B, 6B, 7B and R.

Light Blue super., Silk Blues R and greenish.

Methyl Alkali Blue MLB, Victoria Blues B, R and 4R.

Patent Blues, L, N, V, A and superfine, Cyanine B.

Keton Blue 4BN, Indigo Substitute BS ext., WE.

Patent Marine Blue L E, Azo Acid Blue B.

Naphthalene Blues B and DN.

Violets—Acid Violets 4RS, 5BF and 7BN, Neutral Violet O.

Victoria Violets 4BS, 8BS.

#### BASIC COLORS.

Malachite Greens, Brilliant Greens.

Primula R and Victoria Blues B, R and 4R.

#### DIRECT COLORS.

Browns—Dianil Browns, BD, G, and 3GO, Dianil Fast Brown B.

These may also be developed with Developer AR.

Blues—Dianil Blues B, G, 2R, 4R, Dianil Dark Blue R, Dianil

Azurine G, Dianil Indigo O, Dianil Indigo O may also be developed with Developer AR.

Blacks—Dianil Blacks CR, N, PR. The last may be developed with Developer AR.

Reds—Dianil Red 10 B, Direct Scarlet AF, Direct Red BF.

Greens—Dianil Green G, Direct Green CB.

Yellows—Aurophenine, Cresotine Yellow G.

**COLORS DISCHARGES**—If it is desired to print colored discharge patterns the following dyestuffs may be used in the discharge pastes, as they resist the action of the hydrosulphite.

#### ACID COLORS.

Yellow—Chinoline Yellow.

Orange and Red—Eosine, Phloxine, Erythrosine, Rose Bengal,

Rhodamines extra, B extra, G extra.

Blues—Fast Blues, Indulines.

**BASIC COLORS.**

Yellows—Auramine O, Fast Yellow T T.

Red—Rosazine 4 G.

Browns—Phosphine extra and superfine.

Blues—Thionine Blue G O, Methyline Blue D B B.

Green—Thionine Blue G O combined with Fast Yellow T T.

**DIRECT COLORS.**—Dianil Yellow O O.

**MORDANT COLORS.**

Alizarine Blue S B powder, Indigo M L B.

Coeruleine S powder, Indigo M L B R R.

**SILK AND HALF-SILK DISCHARGE PRINTING.**

The only successful method that has thus far been used for the satisfactory discharge upon silk and half-silk goods is the Zinc Dust-Bisulphite discharge, but this possesses the great disadvantage of clogging the print rollers, producing uneven results.

Hydrosulphite N F for this purpose being readily soluble in such solutions as are necessary for discharging these kinds of goods, possesses none of the disadvantages of the older discharges, and produces results which are far superior to those produced with the Zinc Dust-Bisulphite discharge.

The method of application is simple, the dyed goods being printed with the Hydrosulphite N F discharge paste, dried thoroughly, and steamed for a few minutes in a Mather-Platt machine, modified as noted for INDIGO printing. It is essential that the goods be absolutely dry before introducing into the steaming chamber, and that the steam be live steam, free from air, as wet steam gives unsatisfactory results. The best results can be obtained where the steam, after its expansion in the steaming chamber, is of a temperature of 212–215° F.



## DYEING METHODS FOR DISCHARGE WORK.

The following quantities are for 100 pounds of goods:

## BLACK ON SILK GOODS.

12 lbs. Discharge Black N F dissolved in 700 gallons of water,  
8 ozs. Sulphuric Acid to each 125 gallons of dye bath.  
Dye one-quarter hour at 85° F. and then three-quarters of  
an hour at a temperature of 160-175° F. Wash, and  
brighten with Sulphuric Acid.

## NAVY BLUE ON HALF-SILK GOODS.

## First Bath—

- 5 lbs. Dianil Dark Blue R,
  - 2 lbs. Dianil Black C R,
  - 2 lbs. Alkali Blue 2 B, dissolved in 350 gallons of water,  
with
  - 2 lbs. Marseilles Soap,
  - 3½ ozs. Soda,
  - 5 lbs. Common Salt,
- } to each 125 gallons of dye bath.

Enter the goods at a temperature of 120-140 F., raise to the  
boiling point and boil one hour and wash.

## Second Bath—

- 2.4 ozs. Flavazine T.
  - .4 ozs. Acid Violet 5 B F in 600 gallons of water, and
  - 8 ozs. Sulphuric Acid to each 125 gallons of dye bath.
- Dye one-quarter hour cold and three-quarters of an hour  
at a temperature of 160-175° F. Wash and brighten with  
Sulphuric Acid.

## BLACK ON HALF-SILK.

## First Bath—

- 8 lbs. Dianil Deep Black B conc. in 350 gallons of water,
  - 2 lbs. Marseilles Soap,
  - 5 lbs. Common Salt,
  - 3 ozs. Soda,
- } to each 125 gallons of dye liquor.
- (14)

## 210 YEAR-BOOK FOR COLORISTS AND DYERS.

Enter the goods at 120-140° F., bring to the boil, boil one hour and wash.

### Second Bath—

2 lbs. Discharge Black N F in 600 gallons of water, with 8 ozs. Sulphuric Acid to each 125 gallons of dye bath.

Dye one-quarter hour at 85° F. and three-quarters of an hour at 160-175° F., wash and brighten with Sulphuric Acid.

### WHITE DISCHARGE PASTE.

The Hydrosulphite N F is dissolved in an aqueous gum solution, upon a water bath, at 140° F., in the following proportions:

Discharge White.	N F 300.	N F 400.	N F 500.
Hydrosulphite N F....	300 parts.	400 parts.	500 parts.
Gum Water 1 to 2.....	700 "	600 "	500 "
	1,000 parts.	1,000 parts.	1,000 parts.

### COLORED DISCHARGES FOR SILK.

#### Discharge Yellow A N F—

35 parts Auramine O are dissolved in  
185 parts Water and  
30 parts Glycerine and added to  
300 parts Gum Water 1.1,  
50 parts Alcohol.

When cold, add

400 parts Discharge White N F 500.

#### Discharge Yellow F N F—

Like Discharge Yellow N A F, but instead of Auramine use 30 parts of Flavo Phosphine G O.

#### Discharge Red P N F—

Like Discharge Yellow A N F, but instead of Auramine, use 20 parts Phloxine A G.

#### Discharge Green A N F—

Like Discharge Yellow A N F, but instead of Auramine, use

15 parts Auramine O,

15 parts Thionine Blue G O.

Discharge Red E N F—

Like Discharge Yellow A N F, but instead of Auramine, use

50 parts Eosine Extra A G.

Discharge Blue T N F—

Like Discharge Yellow A N F, but instead of Auramine, use

30 parts Thionine Blue G O.

The dyed silk is printed with the discharge color, thoroughly dried and steamed for three minutes in a Mather-Platt machine, with live steam at a temperature of 212-215° F., and washed. The washing must be done very thoroughly, or otherwise the acid dyestuffs will bleed into the white. The printed goods are then passed through a cold bath of

2 parts of Tartaric Acid,	} per 1,000
1 part of Potassium Bichromate,	

—and then through a solution of

10 parts Gelatine,	} per 1,000
2 parts Tartaric Acid,	

Squeezed and immediately dried upon a drying cylinder.

#### COLORED DISCHARGES FOR HALF-SILK.

Discharge Yellow T N F—

30 parts Fast Yellow T T,

30 parts Glycerine,

260 parts Water,

180 parts British Gum Powder,

are dissolved, by warming, and when cold, added to

400 parts Hydrosulphite-Tannin Solution,

100 parts Hydrosulphite N F 4:1.

1,000

Discharge Rose R N F—

The same as Discharge Yellow T N F, but instead of Fast Yellow T T, use 40 parts Rosazine 4 G.

## 212 YEAR-BOOK FOR COLORISTS AND DYERS.

### Discharge Red R N F—

- 15 parts Rhodamine B Extra,
  - 15 parts Fast Yellow T T,
  - 30 parts Glycerine,
  - 310 parts Water,
  - 180 parts British Gum Powder,  
are warmed together until dissolved, and when  
cold, add
  - 400 parts Hydrosulphite-Tannin Solution,
  - 50 parts Hydrosulphite N F 4:1.
- 

1,000

### Hydrosulphite-Tannin Solution—

- 150 parts Hydrosulphite N F are dissolved in
  - 50 parts Water, at a temperature of 120° F.,  
add
  - 50 parts Alcohol,  
add slowly, under constant stirring.
  - 150 parts of an aqueous Tannin solution 1:1.
- 

400

### Hydrosulphite N F 4:1—

- 800 parts Hydrosulphite N F are dissolved in
  - 200 parts Water at a temperature of 120-140° F.
- 

1,000

Before use, warm slightly

### Discharge Green T N F—

- 20 parts Fast Yellow T T,
  - 7 parts Thionine Blue G O,
  - 30 parts Glycerine,
  - 393 parts Water.
  - 200 parts British Gum Powder,  
are warmed until dissolved, and when cold add
  - 350 parts Hydrosulphite-Tannin Solution.
- 

1,000

The dyed half-silk is printed with the discharge color, thoroughly dried and steamed for three minutes in a Mather-Platt machine, with live steam at a temperature of 212-215° F. Pass through a cold tartar emetic bath containing ten parts tartar emetic to 1,000 parts of water, and then thoroughly wash with the addition of tartaric acid, as previously described in the treatment of silk goods. Then squeeze thoroughly and dry on a drying cylinder.

#### PARANITRANILINE RED AND PARABROWN DISCHARGES.

The printing pastes are made up as before described with gum solution or British gum thickening. For colored discharges basic colors which stand the reducing action of the hydrosulphite are used. These are given at length on page 208. Alizarine colors as Alizarine Red, Brown, Blue, Claret, Green and Coeruleine may be used, but as the shades are dull their use is limited. With these acetate of chrome is required in the discharge paste as a fixing agent. Dianil Yellow O O is the only direct color which stands the reducing action of the hydrosulphite. Indigo M L B can also be used; the formula for this is given under indigo printing.

Pigment colors, which are not affected by the discharge, can be used with albumen for colored discharge patterns.

Para Browns may by the use of alkaline hydrosulphite paste be printed in half discharge effects, giving light and cutch brown shades on dark ground.

In the use of basic colors for discharges on azo colors on cotton, two methods may be followed, either to add the tannin to the discharge paste or to prepare the material before printing with tannin, after Romann's method. The objection to the first method is that it is impossible to use acetic acid with the hydrosulphite which is decomposed by acids and, therefore, the tannin and dyestuffs form lakes which interfere with the proper working of the pastes. To avoid this alcohol is added, which improves them somewhat.

In the case of preparation of the goods with tannin beforehand, the pastes contain tartar emetic instead of tannin and have the advantages of a much better printing quality and greater stability, and the discharge effects are more brilliant, and with care it is possible to get a satisfactory white on tannin-prepared material, but with the ordinary method it is possible to obtain a much bluer shade of red.

The preparation of the material and printing can be done with the usual machines and apparatus, but the same care should be taken in steaming as before described under indigo. The printed and well-dried goods should be steamed for three to five minutes at 216-221° F. with live steam. After steaming the goods should lie for a time to allow the reduced color to develop and then passed through the tartar emetic bath (1-100) during twenty seconds. Next through a solution of Bichromate (5-1000) cold, washed and soaped. These operations fix and develop the colors and wash off the excess of loose dyestuff. They are all done in the open washer, and it is best to dry the goods directly on the dry cans. The proportion of Hydrosulphite N F in white and colored discharges must be regulated by the depth of the color to be discharged, the kind of material, the depth of engraving, etc. The pastes are made up in the same way as for half silk.

FOR HALF DISCHARGE work use

200	parts	Hydrosulphite N F.
200	"	Water.
300	"	British Gum Thickening.
300	"	Alkali Thickening.

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To make 1,000 parts.

ALKALI THICKENING.

100	parts	British Gum.
900	"	Caustic Soda Sol. 40° Bé.

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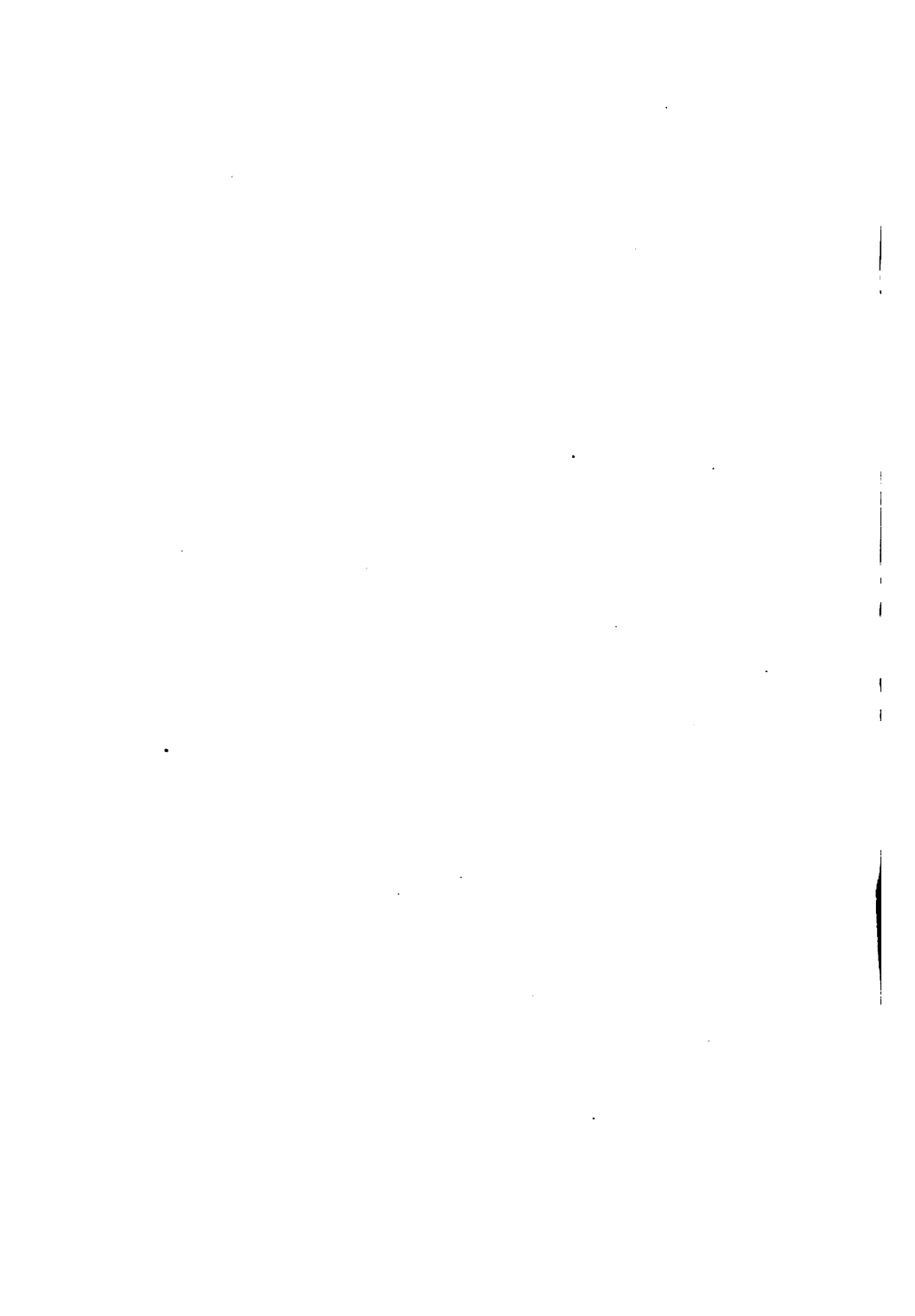
To make 1,000 parts.

## DIANIL COLOR DISCHARGES.

The bleached material is dyed, as usual; some of the colors may be developed with Developer A R, if necessary, washed and dried. The goods are then printed with the white or colored discharge pastes, well dried, steamed for three minutes in the Mather Platt machine, as described under indigo printing, washed in the open washer; if colored discharges, passed through solution of tartar emetic, soaped, washed again and dried.

It is possible on account of the energetic action of the Hydro-sulphite discharge pastes that doctor-streaks and tarnishing may result from the slight unevenness of the print roller or insufficient pressure on the doctor, and produce an unsatisfactory result. To avoid this it is recommended to prepare the material with a weak (1-100) solution of chlorate before printing.

The methods of working and the composition of the discharge paste will be found on page 210 under half silk printing, except that the white discharge may be reduced to 200 N F in 1000 for light shades. The colors suitable for this purpose may be found on page 207.





PART V.



EDUCATIONAL.



# EDUCATIONAL,

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## NEW BEDFORD TEXTILE SCHOOL.

This institution had a prosperous year, as may be seen from the following abstract of the report of the managing director:

During the past corporation year the equipment of the knitting department has practically been completed so far as the present necessities are concerned, and this department put into operation. There are still a few machines that have been promised that have not been received, but generally speaking this department is now admirably equipped for the purpose for which it is intended, and by the time the students reach a point where they need any additional machines, no doubt the generosity of the machine builders will provide them.

The machinery added includes that for knitting hosiery, underwear, sweaters, etc., as well as sewing machines, button and buttonhole machines, and others required for finishing garments.

Attention has been devoted to improving the weaving department, and with this object in view the spoolers, warpers, and cone winders have been removed to make room for eight additional looms, including three new jacquard looms, two lappet looms, two dobby looms, one magazine loom, and one fancy cotton loom. Some of these have been received and started and the others will be in operation within a month. This will give an equipment of twenty-four power looms as against sixteen previously in use, and affords facilities for extending the evening classes.

The machines taken from the weaving room, together with

additional winding and other machines needed in connection with the knitting department, have all been placed in the annex on the first floor, making an admirable yarn preparation room.

The school and its equipment has never been in better physical condition than to-day, as, besides the additions to the equipment, a number of smaller improvements and changes have been made in the direction of improving the condition of the building and the instruction appliances, and the opinion has been frequently expressed by visiting manufacturers and others that for purely cotton manufacturing it is the best equipped textile school in America or Europe.

Some changes have taken place in the staff of the school since the last annual meeting. It was considered desirable to make changes in two departments: the carding and spinning department and the designing department. The place of E. E. Bartlett in the former department was filled by the appointment of James T. Broadbent, acting director of the Mississippi Textile School, who was formerly instructor in the same department; and the position held by Herman Wahlgren was filled by the appointment of Samuel Holt, designer in the Boott mills of Lowell, Mass., formerly an instructor in the hand loom department of this school. In other respects the school opened with the same staff as last year, both in the day and evening, but since the school has been in session Samuel Taylor and Robert Schofield, instructors in the carding and spinning department, respectively, have resigned owing to pressure of other work, and their places have been filled by Charles F. Heap and T. H. Roberts. Mr. Taylor and Mr. Schofield have been instructors in the evening classes almost from the beginning of the school's work, and their services are relinquished with regret.

James T. Broadbent has also resigned as teacher in carding and spinning, having been appointed to the same position with the Fall River Textile School.

The attendance in the day classes is larger than in any previ-

ous year, each year having shown a growth in the attendance, although it cannot yet be considered very large.

The new spring term opens with 123 evening textile students as against 116 last year; in other words, out of a smaller entering class an actually larger number has returned and paid tuition for the second term, and the attendance is some 15 per cent. better than in the previous year.

As one of our tests of the efficiency of the school is the proportion of students who return for further instruction, it tends to prove that the students must be satisfied, and that they have confidence in the methods of instruction.

About 425 visitors have signed the register during the past year, including some from England, Canada, China and New Zealand.

The courses of instruction in this institution and the equipment of machinery and apparatus cover practically all departments of study that textile students are likely to require in connection with local branches of the industry.

**LOWELL TEXTILE SCHOOL**

During the past year the Lowell Textile School has moved into its new buildings, which occupy a sightly location upon the north bank of the Merrimac River.

The Chemistry and Dyeing Department occupies an entire half of Southwick Hall, the main building of the school. In the basement is located the dye house, which is being equipped with practical dyeing machinery. Upon the first floor are the lecture hall, experimental dyeing laboratories, chemical museum and administration rooms. The top floor is occupied by the general chemistry laboratory, quantitative laboratory, balance room, microscopic and volumetric laboratory, class room and instructor's room.

This department has just passed through a very successful year, and many improvements have been made in both curriculum and equipment. The following is an outline of the studies taken by those in the regular course in chemistry and dyeing:

**FIRST YEAR—FIRST TERM.**

(Common to All Courses.)

Design Construction,	Cloth Construction,
Cloth Analysis,	Hand Looms,
Elements of Mechanism,	General Chemistry,
Mechanical Drawing,	Freehand Drawing.

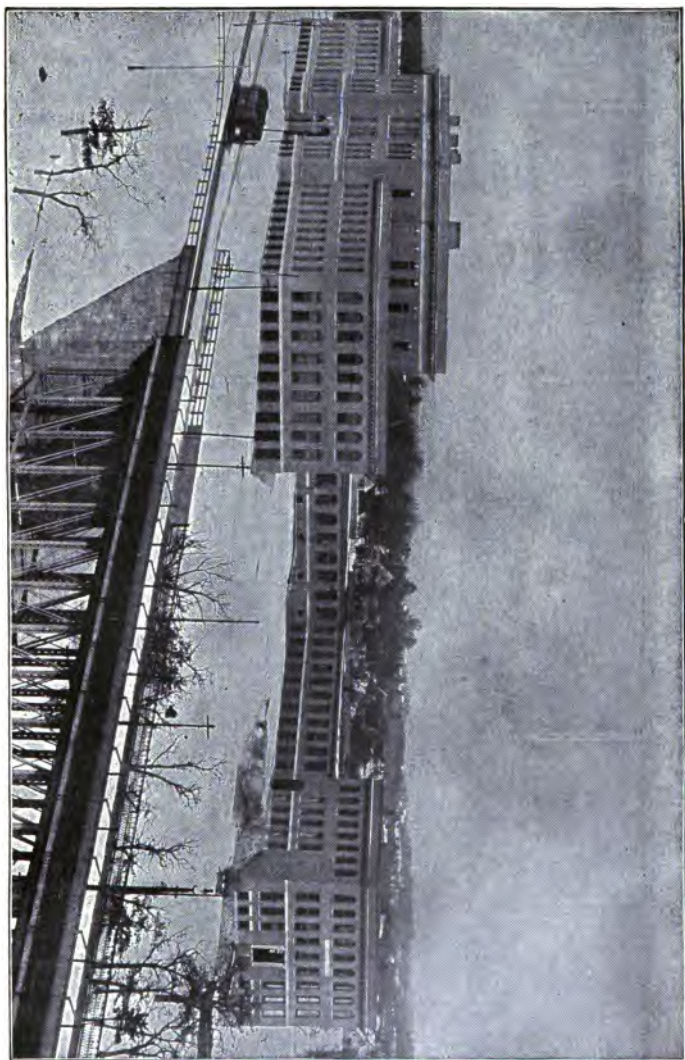
**Options:**

German, Advanced Mathematics.

**FIRST YEAR—SECOND TERM.**

General Chemistry,	Qualitative Analysis,
Stoichiometry,	Mechanical Drawing,
Elements of Mechanism,	Designing.
Cloth Analysis,	Hand Looms,

German.







## SECOND YEAR.

Textile Chem. and Dyeing, Lectures.  
Textile Chem. and Dyeing, Lab.  
Applied Mechanics.  
Industrial Chemistry.  
Advanced Inorganic Chem., Lectures.  
Organic Chemistry, Lectures.  
Electricity, Lectures.  
Quantitative Analysis.

## Options:

Designing, Weaving, German.

## THIRD YEAR.

Quantitative Analysis.  
Advanced Textile Chem. and Dyeing, Laboratory.  
Advanced Textile Chem. and Dyeing, Lectures.  
Dye Testing.  
Physical Chemistry, Lectures.  
Industrial Chemistry, Lectures.  
Industrial Chemistry, Laboratory.  
Microscopy, Laboratory.  
Thesis.

## Options:

Weaving, Mill Engineering.

The instructing staff of the department is as follows:

- L. A. Olney, A. C., Professor of Chemistry and Dyeing.  
G. C. Spencer, S. B., Instructor in Quantitative Analysis.  
H. F. Schwarz, A. R. C. S. L., Instructor in Industrial Chemistry and Dyeing.  
M. R. Moffett, S. B., Instructor in General Chemistry and Qualitative Analysis.  
H. A. Matteson, A. B., Instructor in Dyeing.

**PHILADELPHIA TEXTILE SCHOOL.**

This institution has continued its able and successful work during the year. For particulars in regard to courses, equipment, etc., see volume 5.

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**BRADFORD DURFEE TEXTILE SCHOOL,**

**FALL RIVER, MASS.**

This institution is to be opened in March, 1904, with full equipment for all branches of the study of textile manufacturing.

**DIVISION OF CHEMISTRY AND DYEING  
MISSISSIPPI TEXTILE SCHOOL.**

L. Charles Raiford, in Charge.

The Mississippi Textile School, a department of the Mississippi A. and M. College, began instruction with the session of 1900-1901. Work in the division of chemistry and dyeing was taken up during the year 1902-1903. Since that time the courses of study have been arranged so that a student may follow a direct line of work from the elementary chemistry usually taught in the preparatory schools to the problems of color chemistry dealt with here.

The textile worker deals with materials which are among the most valuable, and at the same time the most perishable, of those used in the various lines of manufacture. It is reasonable to expect, then, that those who are in charge of such operations as carding, spinning and weaving have an intimate knowledge of the fibres they are constantly handling, and that those having to do with the processes of bleaching, dyeing and finishing are thoroughly familiar with the actions of the various chemicals used on the fibre in question. Such knowledge is of the greatest importance to both operative and employer. In order to turn out a creditable product both the director and the one who carries out the details of the process should understand exactly what is being done. As a matter of fact, however, the majority of persons engaged in textile manufacturing know comparatively nothing of the chemical behavior or of the physical structure and properties of the materials with which they deal.

Dyeing is one of the chief divisions of applied chemistry. Through all of its early history—in fact, until within the past few decades—it was regarded as a secret art. Not only was it thought, by the uninitiated, that the dyes themselves were produced by some magic process, but the methods of their application were carefully guarded. The colors known were few, and dyeing with them was by no means an easy task.

During the last half-century the study of chemistry in this connection has brought about a remarkable change. It has explained the particular behavior of the earlier dyes, and has led to the preparation of thousands of new compounds having dyeing properties. In short, the dyer's art has been placed on a true scientific basis.

But this is not all. The many new dyeing compounds brought out have opened a wide field for adulteration, of which unscrupulous manufacturers and dealers have been quick to take advantage. It must be noted here that adulteration is usually carried on, when practiced at all, under the direction of chemists equally as skilled as those who prepare and dispense pure products. In other words, the methods of adulteration keep pace with those of discovery and research for legitimate purposes. Hence the necessity for educated dyers—men who are able to determine the value of a color in an experimental way before attempting to use it on a commercial scale. We recognize and appreciate the great mass of information furnished by nearly every manufacturer with reference to his own dyes, but it is clear that these directions, useful as they are for the operations described, cannot apply to all possible cases in the commercial application of the dyes. The ability to secure first-hand information regarding a new dye, such as the determination of what colors shall be mixed with it in order to produce a given shade, is absolutely indispensable to any one who would carry on successfully the work in any division of textile coloring.

As arranged at present, the work in chemistry and dyeing in this school extends over a period of two years. It was designed with the idea of giving a sound elementary knowledge of the sciences which underlie the operations of bleaching, dyeing, calico printing, etc. It includes the general methods of analytical chemistry as applied in the qualitative analysis of the various bases, acids and salts, and the quantitative determinations of some of the more important mordants and assistants used in the textile industry; the leading facts

and principles of organic chemistry as exemplified in the preparation of typical fatty compounds; a special study of synthetic coloring matters as set forth in the preparation and testing of certain aromatic compounds representing the substantive, acid, basic and mordant dyes; the application of these dyes to textile material.

The work is accomplished by means of lectures followed by laboratory exercises. In these an attempt is made to direct the various operations without actually telling the student all there is to be learned from them. At the beginning of a laboratory period each student is furnished with a printed outline which gives specific directions for the operation under consideration. A number of questions are suggested by the outline, and the student is expected to draw the corresponding conclusions, which he is required to record in a suitable note book. Such records are thus the results of what has actually been observed during the performance of the operation, and not afterthoughts, such as might be written after consulting some reference book. The value of reference is pointed out at the proper time, but the ability to draw a valid conclusion from one's own work is far more important. As a whole, the course is sufficiently broad to be a commentary on whatever preliminary training in chemistry the student may have had, and to serve as an introduction to work on a commercial scale.

#### EQUIPMENT.

The division is furnished with an experimental laboratory and a practical dyehouse. Adjacent are the instructor's office and the instructor's laboratory. The students' experimental laboratory is fitted up with appropriate work tables, each being supplied with gas and water and the necessary apparatus, furnishing accommodation for about fifty students working by detachments. Apart from the apparatus supplied at the beginning of the term to each student for his individual work,

the laboratory provides a general outfit for both gravimetric and volumetric operations, including analytical chemical balances, burettes, graduated flasks, etc.

The dyehouse is supplied with the necessary apparatus and appliances for dyeing larger quantities of material than those dealt with in the experimental laboratory. Included in this portion of the equipment are the following:

One dry room.

Eight dye vats, regulation size.

One Thomas Phillips patches steamer.

One Schaum & Uhlinger hydro-extractor.

One Delahunty raw stock dyeing machine.

One Mather & Platt printing machine.

#### COURSES IN CHEMISTRY AND DYEING.

Note.—According to the present arrangement, the instruction in elementary work in descriptive chemistry is given by the academic department of the college. Students reporting for work in textile chemistry must be able to begin with qualitative analysis.

1. Qualitative Analysis. Eight hours. First term. Required of all Juniors.

An introduction to the study of analytical chemistry, including the classification of metals, the characteristic tests for different elements, the detection of bases, acids and salts, writing equations and calculation of results.

Instruction is conducted by means of lectures with experiments, written exercises and individual laboratory work. Each student must analyze several liquids and solids, which work serves to illustrate the principles discussed in the class room. Special attention is called to such substances as are of importance in the manufacture or application of dyes.

2. Quantitative Analysis. Eight hours. Second term. Required of all Juniors.

A study of the quantitative precipitation and separation

of certain representative elements and compounds; the use of burettes, graduated flasks and the chemical balance; a discussion of the merits of different systems of weights and measures.

The methods of instruction are, in general, similar to those described under 1. Care is taken to develop accuracy in observation, neatness and clearness in written descriptions of the same, and to this end each student is required to write a report—including the necessary notes and references from standard works on the subject—of every experiment performed by him.

3. Carbon Compounds or Organic Chemistry. Eight hours. Third term. Required of all Juniors.

An extended series of exercises in the study of carbon compounds. Each student must prepare and test a number of substances belonging to the various groups of organic compounds and write reports describing the operations and the products. When samples showing the results or the importance of the operation described are obtainable, these must be submitted with the report. No work will be regarded as satisfactory until reports and samples have been examined and accepted by the instructor.

11, 12, 13. The Dyeing of Textile Fabrics. Eight hours through the year. Required of all Seniors.

A general course dealing with the behavior of fibres toward reagents—acids, alkalies, chlorine, etc.; bleaching of cotton with various substances; the theories of dyeing; water in its application to dyeing; the application of substantive dyes to cotton—including the methods of aftertreatment with metallic salts, developing, coupling, etc.; the mordanting process—tannin and metallic compounds; dyeing of cotton with basic and mordant dyes; the use of insoluble dyes—the application of indigo, aniline black, Turkey red, azo colors produced on the fibre, sulphur dyes, pigments; the mixing of colors for

the production of compound shades; color matching; the valuation of dyes by means of comparative tests; calico printing.

Methods as given above. All dyes experimented with are tested for their resistance to light, washing, acids, alkalies, chlorine, etc., and the samples thus obtained must be fastened to a card arranged for the purpose of showing the results of the tests indicated. A faithful performance of all laboratory work is insisted on.



BOOKS OF THE YEAR.

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FOREIGN.

LA GRANDE INDUSTRIE CHIMIQUE MINÉRALE.

Par E. Sorel.

C. Naud, Paris, 1903.

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ENCYCLOPÉDIE UNIVERSELLE DES INDUSTRIES TINCTORIALES ET DES INDUSTRIES ANNEXES.

Par M. Jules Garçon.

II. Vol.

Société Industrielle de Mulhouse, 1903.

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LES INDUSTRIES CHIMIQUES ET PHARMACEUTIQUES.

Par Albin Haller, II Vols.

Gauthier Villars, Paris, 1903.

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KHAKI AUF BAUMWOLLE UND ANDEREN TEXTILTÖFFEN.

Eine Monographie von Dr. F. C. Theis.

M. Krayn, Berlin, 1903.

**232    YEAR-BOOK FOR COLORISTS AND DYERS**

**PRAKTISCHES HANDBUCH DES ZEUGDRUCKS.**

Dr. Eduard Lauber.

Zweite Auflage, III. Band.

Leipzig, 1903.

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**DIE ROHSTOFFE DES PFLANZENREICHES.**

Von Dr. Julius Weisner.

Zweite Auflage, II. Band.

Wilhelm Engelmann, Leipzig, 1903.

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**EINFUEHRUNG IN DIE MODERNE FAERBEREI.**

Von Dr. A. Ganswindt.

B. F. Voigt, Leipzig, 1902.

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**DIE PRAKTISCHE LEDERERZEUGUNG.**

Robert Burkhardt.

A. Hartlebens Verlag, Wien, Pest, Leipzig, 1903.

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**COLORISTISCHE UND TEXTILCHEMISCHE UNTERSUCH-  
UNGEN.**

Von Dr. P. Heermann.

Julius Springer, Berlin, 1903.

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**HYPOCHLORITE UND ELECTRISCHE BLEICHE.**

Von Viktor Engelhardt.

Wilhelm Knapp's Verlag, Halle-on-Saale, 1900.

JAHRBUCH DER CHEMIE.

Herausgegeben von Richard Meyer.

XII Jahr, 1902.

F. Vieweg & Sohn, Braunschweig, 1903.

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DIE ANILINFARBEN UND IHRE FABRIKATION.

Von Dr. K. Heumann, Band IV. herausgegeben von Gustav  
Schultz.

Wiewig & Sohn, Braunschweig, 1903.

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ENGLISH AND AMERICAN.

ANIMAL AND VEGETABLE FIXED OILS, FATS, BUTTERS  
AND WAXES.

By C. R. Alder Wright, D.Sc., F.R.S.

Second Edition.

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A THEORETICAL AND PRACTICAL TREATISE ON THE  
MANUFACTURE OF SULPHURIC ACID AND ALKALI  
WITH THE COLLATERAL BRANCHES.

By George Lunge, Ph.D.

Third Edition, Vol. I., Parts I. and II. Sulphuric Acid.

Gurney & Jackson, London, 1903.

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INDIA RUBBER AND GUTTA PERCHA.

From the French of Seellgmann, Torrilhon & Faconet.

By John Geddes McIntosh.

Scott, Greenwood & Co., London, 1903.

**MERCERIZATION.**

Vols. I. and II.

By the Editors of "Dyer and Calico Printer."

Heywood & Co., London, 1903.

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**PRACTICAL TANNING.**

A Handbook of Modern Processes, Recipes and Suggestions for  
the Treatment of Hides, Skins and Pelts of  
Every Description.

By Louis A. Flemming.

Henry Carey Baird & Co., Philadelphia, 1903.

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**PRINCIPLES OF DYEING.**

G. S. Fraps, Ph.D.

The Macmillan Company, New York, 1903.

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**CHEMISTRY, INORGANIC AND ORGANIC.**

By Charles L. Bloxham.

Revised and Rewritten by John Miller Thomson, LL.D., F.R.S.,  
and Arthur G. Bloxham.

J. & A. Churchill, London, 1903.

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**THE PRINCIPLES OF LEATHER MANUFACTURE.**

H. R. Proctor, F.I.C., F.C.S.

E. & F. N. Spon, London, 1903.

Spon & Chamberlain, New York.

PART VI.

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LIST OF DYESTUFFS,  
MAKERS AND  
METHODS.



## LIST OF DYESTUFFS, MAKERS AND METHODS.

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(Abbreviations Used to Indicate the Dyestuff Manufacturers and Their Agents.)

(A) Berlin Aniline Works, 213-215 Water St., New York; 122 Walnut St., Philadelphia; 124 Pearl St., Boston; 208 Kinzie St., Chicago; 9 E. Pearl St., Cincinnati; 27 S. Tryon St., Charlotte, N. C. American agents for the Actiengesellschaft für Anilinfabrikation in Berlin.

(A A C) American Color & Chemical Co., Albany, N. Y. Agent (At). Consolidated with H. R. W.

(A C) Anchor Color Mfg. Co., 462 Cherry St., New York.

(A M) Actiengesellschaft für Chemische Industrie, Mannheim, Germany.

(Ash) T. C. Ashley & Co., 145 Milk St., Boston.

(At) F. E. Atteaux & Co., 176 Purchase St., Boston; 176 Fulton St., New York; 17 Kinzie St., Chicago; West Fulton St., Gloversville, N. Y.; 53 Colborne St., Toronto, Ontario; 15 Lemoine St., Montreal, P. Q.

(B) Badische Anilin und Sodafabrik, Ludwigshafen am Rhein, Germany. Agent (P K).

(B A Co.) British Alizarine Co., Ltd., Silvertown, Victoria Docks, London, England. Agent (Bch).

(Ba) Bairstow & Co., 211 Pearl St., New York.

(B C F) Basler Chemische Fabrik, Basel, Switzerland.

(Bch) Beach & Co., Hartford, Conn. Agents for (B A Co.).  
(Br S). (E F W), (Grie) and (Rh).

## YEAR-BOOK FOR COLORISTS AND DYERS.

(Bd) J. A. & W. Bird & Co., 43 Cedar St., New York.  
Agents for (ClCo) and (LD).

(B E) C. vom Bauer, Elberfeld, Germany.

(B K) Leipziger Anilinfabrik Beyer und Kegel, Leipzig,  
Germany. (Closed).

(B L) Bosson & Lane, 36 Central Wharf, Boston, Mass.

(Bt) F. Bredt & Co., 194 Fulton St., New York; 12 S. Front  
St., Philadelphia. Agents for (K B).

(Br S) Brooke, Simpson & Spiller, Ltd., Hackney Wick,  
London, England. Agents (Bch).

(Bs) C. Bischoff & Co., 88 Park Place, New York; 139 S.  
Front St., Philadelphia; 124-126 Purchase St., Boston; 10 Wey-  
bosset St., Providence; 196 Michigan St., Chicago; 416 St. Paul  
St., Montreal. Agents for (D) and (L).

(By) Farbenfabriken, vormals Fried. Bayer und Co., Elber-  
feld, Germany; 40 Stone St., New York; 32 India St., Boston;  
13 N. Water St., Philadelphia; 189 Kinzie St., Chicago.

(C) Leopold Cassella & Co., Frankfort-am-Main, Germany.  
Manufacture Lyonnaise de Matieres Colorantes, Lyons, France,  
and Russische Anilinfarbenfabrik, Riga. Agent (Math).

(Math) Cassella Color Co., successors to W. J. Matheson &  
Co., Ltd., 182-184 Front St., New York; 126-128 S. Front St.,  
Philadelphia; 524 Atlantic Ave., Boston; 64 Exchange Place,  
Providence; 47 N. Pryor St., Atlanta, Ga.; Youville Square,  
Montreal.

(C D C) Central Dyestuff and Chemical Co., Plum Point  
Lane, Newark, New Jersey.

(Cl Co) The Clayton Aniline Co., Ltd., Clayton, Manchester,  
England. Agent (Bd).

(C J) Carl Jäger Anilinfarbenfabrik, Barmen, Germany.

(C R) Claus & Rée, Droylsden, Manchester, England.

(C V) Colne Vale Chemical Co., Milnsbridge, Huddersfield,  
England.



## LIST OF DYESTUFFS, MAKERS AND METHODS.

- (Cz) John Casthelaz, Bruère & Co., Belbeuf, Rouen, France.
- (D) Farbenfabrik Dahl & Co., Barmen, Elberfeld, Germany.  
Agents (Bs).
- (D H) Farbwerke vormals Durand, Huguenin & Co., Basel and Hünningen. Agent (Klp).
- (D W) L. Destree, A. Wiescher & Co., Haeren near Brussels, Belgium.
- (E H) E. de Haen, List, near Hanover, Germany.
- (E F W) Elton Fold Works, Bury, Lancashire, England.  
Agent (Bch).
- (F) Farbwerk Friedrichsfeld, Mannheim, Germany.
- (F G B) F. G. Brown, 112 N. Delaware Ave., Philadelphia.
- (Fl) Alfred Fischesser & Co., Muhlhausen, Elsass, Germany.  
(Closed).
- (L F) L. B. Fortner, 36-38 Strawberry St., Philadelphia.
- (F T M) Fabriques de Produits Chimiques de Thann et de Mulhouse, Alsace, Germany.
- (G) Anilinfarben und Extract Fabriken, vormals Joh. Rud. Geigy & Co., Basel, Switzerland; Greuzbach, Moscow and Maromme. Agent (Keli).
- (Gau) Gauhe & Co., Eitdorf, Germany.
- (Gb) Anilinfarbenwerk, vormals A. Gerber & Co., Basle, Switzerland. Absorbed by (I).
- (Gel) Gelsenheimer & Co., 189 Front St., New York; 19 Pearl St., Boston; 31 S. Front St., Philadelphia. Agents for (O).
- (Gr) Rob. Graesser Chemical Works, Ruabon, North Wales.
- (Gt) Gilbert Aniline Co., Philadelphia.
- (Grie) Farbwerke Griesheim, Germany. Agent (Bch).
- (H) Read Holliday & Sons, Ltd., Huddersfield, England; 7 Platt St., New York; 125 Pearl St., Boston; 107 North Second St., Philadelphia.

## YEAR-BOOK FOR COLORISTS AND DYERS.

(H M.) Heller-Merz Co., Newark, N. J.; 22 Cliff St., New York.

(H R W) Hudson River Anilin Color Works, Albany, N. Y. Agent (By).

(H S) The Hanna-Schoelkopf Co., Schoelkopf, Hartford & Hanna Co., successors.

(I) Gesellschaft für Chemische Industrie, Basle, Switzerland. Agent (Klp).

(In) Innis & Co., 120 William St., New York; 36 Strawberry St., Philadelphia; 161 Kinzie St., Chicago.

(Jb) J. B. Ibels, Brussels, Belgium.

(J H) J. Hauff, Stuttgart, Germany.

(Jy) O. S. Janney & Co., 8-10 Letitia St., Philadelphia; 70 Kilby St., Boston.

(K) Kalle & Co., Biebrich-am-Rhein, Germany; 530 Canal St. New York; 145 Pearl St., Boston; 155 South Front St., Philadelphia.

(Kar) Ph. H. Karcher & Co., 14 Cedar St., New York.

(K B) Kächler & Buff, Crefeld, Germany. Agent (Bt).

(Mz) H. A. Metz & Co., successors to Victor Koechl & Co., 122 Hudson St., New York; 140 143 Oliver St., Boston; 104 Chestnut St., Philadelphia; 19 South Main St., Providence; 4 N. Clark St., Chicago; 210 South Tryon St., Charlotte, N. C.; Empire Bldg., Atlanta, Ga.; Dock and Brown Sts., Newark, N. J.; 181 Second St., San Francisco, Cal.; 55 Francois Xavier St., Montreal, Can.; 28 30 Wellington St. West, Toronto, Can.; Frankfurt-am-Main, Germany, Agents for (M).

(Kell) Geigy Aniline and Extract Company, successors to John J. Keller & Co., 69 Barclay St., New York; 185 Pearl St., Boston; 220 Church St., Philadelphia; 18 Prior St., Atlanta Ga.; 56 S. Water St., Providence. Agents for (G)

(Kl) Kinzelberger & Co., Prague, Austria.

(Klp) A. Klipstein & Co., 122 Pearl St., New York; 50-52

LIST OF DYESTUFFS, MAKERS AND METHODS.

North Front St., Philadelphia; 283-85 Congress St., Boston;  
136 Kinzie St., Chicago; 13 Mathewson St., Providence.  
Agents for (D H), (I) and (N).

(L) Farbwerk Mühlheim, vormals A. Leonhardt & Co.,  
Mühlheim-am-Main, Germany. Agent (Bs).

(L L) John W. Leitch & Co., Milnsbridge, England.

(L D) Lepetit, Dollfus e Gansser, Susa, Milan, Italy. Agent  
(Bd).

(Lev) Levinstein, Limited, Manchester, England. Agents  
Ly.)

(L M) Leeds Mfg. Co., Brooklyn, N. Y.

(Lo) Charles Lowe & Co., Stockport, England.

(L P) Lucien Picard & Co., St. Fons, Lyons, France.  
Operated by (A).

(L Sch) Lembach & Schleicher, Biebrich-am-Rhein, Ger-  
many.

(Ly) Thomas Leyland & Co., 53 India St., Boston, Mass.; 121  
North Front St., Philadelphia, Pa. Agents for (Lev.)

(M) Farbwerke, vormals Meister, Lucius & Brüning,  
Höchst-am-Main, Germany, Creil and Moscow. Agent (Mz).

(Mo) Société Chimique des Usines du Rhone, formerly Gil-  
lard P. Monnet & Cartier, St. Fons, Lyons, France.

(Nat) National Dye Co., Philadelphia.

(N) Carl Neuhaus, Elberfeld, Germany. Agent (Klp).

(N Y B) New York & Boston Dyewood Co., 156 William St.;  
New York; 115 High St., Boston; 122 Arch St., Philadelphia;  
16 Hughson St., Hamilton, Ontario.

(N I) Farbwerk W. Noetzel, Istel & Co., Griesheim-am-  
Main, Germany.

YEAR-BOOK FOR COLORISTS AND DYERS.

(O) K. Oehler, Anilin u. Anilinfarbenfabrik, Offenbach-am-Main, Germany. Agent (Gei).

(P K) Kuttroff, Pickhardt & Co., successors to Wm. Pickhardt & Kuttroff, 128 Duane St., New York; 153 Milk St., Boston; 80 South Water St., Providence; 207 Chestnut St., Philadelphia; 207 Michigan St., Chicago.; 215 Sacramento St., San Francisco. Agents for (B).

(P) Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, France. A. Poirrier and G. Dalsace, Paris. Agent (S S).

(P C) Theodore Peters, Chemnitz, Germany.

(P L.) Pick, Lange & Co., Amersfoort, Holland. Closed  
Chemische Fabrik Amersfoort successors.

(P S) Ferd. Petersen & Co., Schweizerhalle, Basle, Switzerland.

(R) Joh. Conr. Reihlen, Friedensau, Neuhofen, Germany.

(Rce) C. F. Rice, 174 Summer St., Boston.

(R D) Roberts, Dale & Co., Manchester and Warrington, England.

(R E) Remy, Erhart & Co., Weissenthurm-am-Rhein, Germany. Agent, Fr. Schroeder, 100 William St., New York.

(R F) Ruch et Fils, Pantin, France.

(Rh) Société Chimique des Usines de Rhone, France. Agent (Bch). See (Mo).

(S) Chemische Fabrik, vormals Sandoz & Co., Basle, Switzerland.

(S B) A. Sevoz & Boasson, Lyons-Vaise, France.

(St) The Stamford Mfg. Co., 133-137 Front St., New York.

## LIST OF DYESTUFFS, MAKERS AND METHODS.

(Sch) Schoellkopf, Hartford & Hanna Co., successors to the Schoellkopf Aniline & Chemical Co., Buffalo, N. Y.; 100 William St., New York; 135 North Water St., Philadelphia; 21 Pearl St., Boston; 114 East Pearl St., Cincinnati; 145 Kinzie St., Chicago; 105 Reed St., Milwaukee.

(SS) Sykes & Street, 85 Water St., New York; 215 Chestnut St., Philadelphia; 396 Atlantic Ave., Boston, Mass. Agents for (P.)

(Th) E. M. Thayer & Co., 106-112 Broad St., Boston, Mass.

(M) Chemische Fabriken, vorm. Weiler-ter Meer. Uerdinden, Germany,

(U I) United Indigo & Chemical Co., 176 Federal St., Boston.

(V) Verein Chemischer Fabriken in Mannheim, Germany. Agent, Roessler & Hasslacher Chemical Co., 100 William St., New York.

(Va) H. S. Vila, 115 South Second St., Philadelphia. Pa.

(W) Williams Bros., Hounslow, Middlesex, England.

(W C B) W. C. Barnes & Co., Ltd., Hackney Wick, London, England. Agent (Math).

(Z) Friedrich Zimmer, Mannheim, Germany.

## DYEING METHODS.

For economy of space, in order that the information may be more readily found, the dyeing methods are given by certain suggestive letters in accordance with the following:

WA indicates wool is dyed in acetic acid.

WN means that wool is dyed in a neutral bath.

WG indicates that wool is dyed in a bath containing Glauber's salts.

## YEAR-BOOK FOR COLORISTS AND DYERS.

WGS means that wool is dyed with Glauber's salts and sulphuric acid in the bath.

WGSch indicates that wool is first dyed with Glauber's salt and sulphuric acid in the bath and the color then developed with chrome.

WACH means that wool is first dyed with acetic acid and chrome added to develop the color.

WCh indicates that chromed wool is used with the dye.

SA means that silk is dyed in a bath acidified with acetic acid.

SS means that silk is dyed in a bath acidified with sulphuric acid.

CT indicates that the dyestuff is used on cotton mordanted with tannin.

CD means that cotton is dyed direct in one bath.

CDv indicates that the color is developed on cotton by subsequent treatment after direct dyeing.

CAL indicates cotton dyed with alum and Glauber's salt.

CWD—cotton and wool mixed goods dyed in one bath.

SULPHUR denotes one of the new class of sulphur dyes requiring special treatment.

These extremely brief directions are used for the further reason that the dye manufacturers themselves prefer that specific information be obtained from their offices, in many places no dyeing suggestions are given on this account.

# LIST OF DYESTUFFS, MAKERS AND METHODS.

Name of Dye.	Agent or Maker.	Dye Method.
Acetine Blue.....	P K.....	Printing
Acetinduline R.....	Mz .....	Printing
Acetopurpurine 8B.....	A .....	CD
Acetyline Blue 6B.....	Klp .....	CD
Acid Alizarine Black AF, W.....	Mz .....	WGSCh
Acid Alizarine Black 3B, 3Bex.....	Mz .....	WGSCh
Acid Alizarine Black R, AC.....	Mz .....	WGSCh
Acid Alizarine Black SE, SET paste ..	Mz .....	WACH
Acid Alizarine Black SE, SET powder	Mz .....	WACH
Acid Alizarine Black T.....	Mz .....	WGSCh
Acid Alizarine Blue BB.....	Mz .....	WGSCh
Acid Alizarine Blue GR.....	Mz .....	WGSCh
Acid Alizarine Blue Black B.....	Mz .....	WGSCh
Acid Alizarine Brown B, BB, T.....	Mz .....	WGSCh
Acid Alizarine Dark Blue SN.....	Mz .....	WGSCh
Acid Alizarine Garnet R.....	Mz .....	WGSCh
Acid Alizarine Gray G.....	Mz .....	WGSCh
Acid Alizarine Green B.....	Mz .....	WGSCh
Acid Alizarine Green G.....	Mz .....	WGSCh
Acid Alizarine Grenade R.....	Mz .....	WGSCh
Acid Alizarine Red B,G.....	Mz .....	WGSCh
Acid Alizarine Violet N.....	Mz .....	WGSCh
Acid Alizarine Yellow O.....	Mz .....	WGSCh
Acid Anthracene Brown T.....	By .....	WGSCh
Acid Anthracene Red.....	By .....	WGSCh
Acid Black.....	Mz .....	WGS
Acid Black B.....	AAC .....	WGS
Acid Black B No. 4.....	AC .....	WGS
Acid Black 5B, 8B, FL.....	By .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Acid Black 10B.....	Sch .....	WGS
Acid Black C.....	Klp .....	WGS
Acid Black 77.....	AC .....	WGS
Acid Black 2531.....	Kell .....	SS
Acid Black 5534.....	H .....	WGS
Acid Black 5535.....	H .....	WGS
Acid Black J.....	NYB .....	WGS
Acid Black S, 3G.....	H .....	WGS
Acid Blue AA.....	Kell .....	WGS
Acid Blue BB.....	Sch .....	WGS
Acid Blue GG.....	Sch .....	WGS
Acid Blue FS, 466.....	Mz .....	WGS
Acid Blue 76.....	Sch .....	WGS
Acid Blue 100.....	Sch .....	WGS
Acid Blue R.....	NYB .....	WGS
Acid Blue Black 3B.....	By .....	WGS
Acid Brown.....	Bs .....	WGS
Acid Brown D.....	Math .....	WGS
Acid Brown G.....	A .....	WGS
Acid Brown R.....	A .....	WGS
Acid Brown Y.....	Sch .....	WGS
Acid Carmoisine B.....	Bk .....	WGS
Acid Carmoisine 6B.....	H .....	WGS
Acid Cerise.....	Mz, S S.....	WGS, SS
Acid Cerise O, 11.....	Mz .....	WGS, SS
Acid Chrome Black BG.....	By .....	WGSCh
Acid Chrome Brown T.....	By .....	WGSCh
Acid Crimson.....	Bs .....	WGS
Acid Cyanine BR.....	By .....	WGS
Acid Eosine G.....	Mz .....	WGS
Acid Fuchsine.....	Mz, Bs, Klp .....	WGS
Acid Fuchsine S B.....	P K.....	WGS
Acid Green.....	By, Klp, O....	WGS, SS
Acid Green B.....	P .....	WGS
Acid Green 2B.....	P .....	WGS



# LIST OF DYESTUFFS, MAKERS AND METHODS. 239

Name of Dye.	Agent or Maker.	Dye Method.
Acid Green 3B, 6B.....	By, P.....	WGS
Acid Green 4B.....	P .....	WGS
Acid Green bluish.....	NI .....	WGS, SS
Acid Green conc.....	Mz .....	WGS
Acid Green conc. D.....	Mz .....	WGS
Acid Green conc. G.....	Mz .....	WGS
Acid Green conc. M.....	Mz .....	WGS
Acid Green conc. fl.....	Mz .....	WGS
Acid Green D.....	Mz .....	WGS, SS
Acid Green EC.....	Mz .....	WGS, SS
Acid Green extra conc. B.....	Math .....	WGS, SS
Acid Green extra conc. paste.....	Math.	
Acid Green GG.....	H .....	WGS
Acid Green 5G.....	Math .....	WGS
Acid Green J.....	P .....	WGS
Acid Green JEEE.....	P .....	WGS
Acid Green M.....	Mz .....	WGS, SS
Acid Green M., 5 fold conc.....	Mz .....	WGS
Acid Green O.....	Mz .....	WGS
Acid Green OG.....	O .....	WGS, CT
Acid Green 780.....	Math .....	WGS
Acid Grenadine .....	Kell .....	WGS
Acid Grenadine B.....	Kell .....	WGS
Acid Indigo Blue.....	H .....	WGS
Acid Magenta .....	Mz ... PK, SS, WGS, SS	
Acid Magenta B.....	Mz .....	WGS, SS
Acid Magenta BC Crystals.....	Kell.....	WGS, SS
Acid Magenta Crystals.....	Mz .....	WGS, SS
Acid Magenta GC Crystals.....	Kell.....	WGS, SS
Acid Magenta O.....	Mz .....	WGS, SS
Acid Maroon O.....	Mz .....	WGS, SS
Acid Methyl Violet 5B.....	P K .....	WGS
Acid and Milling Scarlet.....	Br S .....	WGS
Acid Naphthol Orange.....		WGS
Acid Navy Blue.....	Bd .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Acid Orange G.....	Kell.....	WGS, SS
Acid Phosphine JO.....	C .....	Leather
Acid Phosphine GO.....	Mz .....	Leather
Acid Phosphine BRO.....	Mz .....	Leather
Acid Ponceau .....	Klp .....	WGS
Acid Rhodamine R, 3R.....	Klp .....	WGS
Acid Rosamine A pat .....	Mz .....	WGS, SS
Acid Rubin (see Fuchsine Ex. S).....		WGS, SS
Acid Rubin SB.....	P K.....	WGS
Acid Rubine BBR.....	Mz .....	WGS
Acid Ruby .....	Klp .....	WGS
Acid Sky Blue.....	At .....	WGS
Acid Violet 2B.....	Kell, P K.....	WGS
Acid Violet 3B extra. BW. ....	By .....	WGS
Acid Violet bluish .....	Kell .....	WGS
Acid Violet 2BN.....	P K.....	WGS
Acid Violet 4B extra.....	By, A.....	WGS
Acid Violet 4BN.....	Klp, PK.....	WGS
Acid Violet 4BS.....	Math .....	WGS, SS
Acid Violet 4BX.....	By .....	WGS
Acid Violet 5B extra.....	Kell .....	WGS
Acid Violet 5BF.....	Mz .....	WGS
Acid Violet 5BFI.....	Mz .....	WGS
Acid Violet 5BS.....	At .....	WGS
Acid Violet 5BX.....	Math .....	WGS
Acid Violet 6B.....	A, By Kell.....	WGS
Acid Violet 6BC.....	Sch .....	WGS
Acid Violet 6BF.....	Mz .....	WGS
Acid Violet 6BIN .....	Mz .....	WGS
Acid Violet 6BN.....	Klp, PK.....	WGS, SS
Acid Violet 6BS.....	Mz .....	WGS
Acid Violet 7B.....	Mz, Klp PK, WGS, SS	
Acid Violet 7BN.....	Mz .....	WGS
Acid Violet Double .....	Kell .....	WGS
Acid Violet N.....	Mz .....	WGS

# LIST OF DYESTUFFS, MAKERS AND METHODS. 241

Name of Dye.	Agent or Maker.	Dye Method.
Acid Violet R.....	O .....	WGS
Acid Violet R conc.....	Mz .....	WGS
Acid Violet R extra.....	By .....	WGS
Acid Violet R R.....	Kell .....	WGS
Acid Violet 2R extra.....	By .....	WGS
Acid Violet 3R extra.....	By .....	WGS
Acid Violet 3RA.....	Mz .....	WGS
Acid Violet 3RS .....	Mz .....	WGS
Acid Violet 4R.....	Klp, PK.....	WGS
Acid Violet 4RS.....	Mz .....	WGS
Acid Violet 5R.....	S W .....	WGS
Acid Violet 6R.....	Sch .....	WGS
Acid Violet S7B.....	PK .....	WGS
Acid Violet S4R.....	PK .....	WGS
Acid Violet VSW.....	O .....	WGS
Acid Violet ii.....	Mz .....	WGS
Acid Violet 118.....	HS .....	WGS
Acid Yellow .....	Mz, A, Klp, Math, O. SS, WGS	
Acid Yellow crystals.....	Mz, Math.....	WGS
Acid Yellow AT.....	Math .....	WGS
Acid Yellow D.....	A .....	WGS
Acid Yellow G.....		
Acid Yellow RS.....	Bs .....	WGS
Acid Yellow S, see Naphthol Yellow...	S.	
Acid Yellow 8822.....	H .....	WGS
Acme Brown .....	Math .....	CT
Acme Yellow .....	Mz .....	WGS, SS
Acridine Gold Yellow, G.....	Bs .....	CT
Acridine Orange .....	Mz .....	SA, CT
Acridine Orange G.....	Bs .....	CT
Acridine Orange NO.....	Mz .....	CT
Acridine Orange R extra .....	Mz .....	CT
Acridine Red B, 2B, 3B.....	Mz .....	CT
Acridine Scarlet R, 2R, 3R.....	Mz .....	CT
Acridine Yellow.....	Mz, Bs .....	SA, CT

## 242      YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Alcohol Blue .....	S, Bs, By, Mz, PK, SS	
Alcohol Blue SFC.....	K.	
Alcohol Eosine .....	tM.	
Alizarine Black Bayer FB, NG, GA...	By .....	WGSch
Alizarine Black 4B.....	Math .....	WA
Alizarine Black 4BN.....	Math .....	WA
Alizarine Black 4BR.....	Math .....	WA
Alizarine Black 4BS.....	Lev .....	WA
Alizarine Black 6B.....	Math .....	WA
Alizarine Black CB, CT.....	Mz .....	WGSch
Alizarine Black D.....	Math .....	WA
Alizarine Black DAC.....	Mz .....	CDv
Alizarine Black DCB.....	Mz .....	CDv
Alizarine Black DCR.....	Mz .....	CDv
Alizarine Black DE.....	Mz .....	CDv
Alizarine Black DG.....	Mz .....	CDv
Alizarine Black DHW.....	Mz .....	CDv
Alizarine Black DN.....	Mz .....	CD
Alizarine Black DPG.....	Mz .....	CDv
Alizarine Black DPR.....	Mz .....	CDv
Alizarine Black DR.....	Mz .....	CDv
Alizarine Black DRN.....	Mz .....	CD
Alizarine Black DT.....	Mz .....	CDv
Alizarine Black DYG.....	Mz .....	CDv
Alizarine Black G.....	Me, By.....	WCh
Alizarine Black P.....	Mz .....	WCh
Alizarine Black R.....	Bs, Math.....	WCh
Alizarine Black RT.....	Mz .....	CDv
Alizarine Black S.....	Mz, Math, PK.....	WCh
Alizarine Black SRA.....	P K.....	WCh
Alizarine Black SW, WB.....	PK .....	WCh
Alizarine Black T.....	Math .....	WCh
Alizarine Black TBA.....	A .....	WGSch
Alizarine Black, WB extra, SW.....	B .....	WCh
Alizarine Black WX extra.....	PK .....	WACH

# LIST OF DYESTUFFS, MAKERS AND METHODS. 243

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Blue A.....	Mz .....	WCh
Alizarine Blue A B.....	B A Co.....	WCh
Alizarine Blue Black 3B.....	By .....	WCh
Alizarine Blue Black WB extra.....	B .....	WACH
Alizarine Blue ASR.....	B .....	WCh
Alizarine Blue B R 3 G.....	By .....	WCh
Alizarine Blue C G.....	By .....	WCh
Alizarine Blue CRW.....	SS.....	WCh
Alizarine Blue CS.....	Math .....	WCh
Alizarine Blue DB.....	Mz .....	CD
Alizarine Blue DBX.....	Mz .....	CD
Alizarine Blue DE.....	Mz .....	CD
Alizarine Blue DET.....	Mz .....	CD
Alizarine Blue DG.....	Mz .....	CD
Alizarine Blue D N.....	Mz .....	WCh
Alizarine Blue D N W.....	Mz .....	WCh
Alizarine Blue D N X.....	Mz .....	WCh
Alizarine Blue DR, D2R, D4R.....	Mz .....	CD
Alizarine Blue FA.....	Mz .....	WCh
Alizarine Blue G.....	Mz .....	WCh
Alizarine Blue G B, P L.....	AC .....	WCh
Alizarine Blue G N .....	Bs .....	WCh
Alizarine Blue G S.....	At .....	WCh
Alizarine Blue G T.....	Bs .....	WCh
Alizarine Blue GW, JR.....	By .....	WCh
Alizarine Blue J G.....	H S.....	WCh
Alizarine Blue NGG powder.....	P K.....	WCh
Alizarine Blue N S.....	By .....	WCh
Alizarine Blue O D R.....	At .....	WCh
Alizarine Blue paste .....	Mz .....	WCh
Alizarine Blue R.....	Mz .....	WCh
Alizarine Blue RR.....	Mz .....	WCh
Alizarine Blue S A P, SKY.....	By .....	WGS, WCh
Alizarine Blue S paste.....	P K.....	WCh
Alizarine Blue S powder.....	P K.....	WCh

244 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Blue SB powder, paste.....	Mz .....	Printing
Alizarine Blue SBW powder.....	Mz .....	WCh
Alizarine Blue SCA.....	Ac .....	WCh
Alizarine Blue SR.....	Mz .....	Printing
Alizarine Blue S2R.....	Mz .....	Printing
Alizarine Blue soluble powder ABS...B A Co.....	.....	WCh
Alizarine Blue Black B, 3B.....	By .....	WCh
Alizarine Bordeaux B in paste.....	By .....	WCh
Alizarine Bordeaux B D in paste .....	By .....	WCh
Alizarine Bordeaux P.....	Mz .....	WCh
Alizarine Bordeaux C.....	Me .....	WCh
Alizarine Bordeaux G, GG.....	By .....	WCh
Alizarine Brown .....	Mz, By, PK .....	WCh
Alizarine Brown AS.....	Klp .....	WCh
Alizarine Brown DB.....	Mz .....	CD
Alizarine Brown DBD.....	Mz .....	CD
Alizarine Brown DD.....	Mz .....	CD
Alizarine Brown, DG, D2G, D3GO, D3GI .....	Mz .....	CD
Alizarine Brown DM.....	Mz .....	CD
Alizarine Brown DR.....	Mz .....	CD
Alizarine Brown DX.....	Mz .....	CD
Alizarine Brown G.....	Mz .....	WCh
Alizarine Brown GN, AW, AT.....	By .....	WCh
Alizarine Brown O DR.....	At .....	WCh
Alizarine Brown paste .....	Mz .....	WCh
Alizarine Brown powder.....	Mz, By .....	WCh
Alizarine Brown O, F, N.....	Mz .....	WCh
Alizarine Brown R.....	Mz, Me, Rice.....	WCh
Alizarine Brown R B.....	By .....	WCh
Alizarine Brown S O.....	P K.....	WCh
Alizarine Brown Y.....	By .....	WCh
Alizarine Cardinal .....	By.....	
Alizarine Carmine .....	B A Co.....	WCh
Alizarine Carmine Blue B, G.....	By .....	WCh

# LIST OF DYESTUFFS, MAKERS AND METHODS. 245

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine C A .....	B A Co.....	WCh
Alizarine Claret DB, DG.....	Mz .....	CD
Alizarine Claret R paste .....	Mz .....	WCh
Alizarine Coelestol R.....	By.....	WGS, WCh
Alizarine Cyanine G paste:.....	By .....	WCh
Aliz. Cyanine R, 2R, 3R, RA extra....	By .....	WCh
Alizarine Dark Blue.....	P K.....	WCh
Alizarine Dark Blue, D, DR.....	Mz .....	CD
Alizarine Dark Blue D3R.....	Mz .....	CD
Alizarine Dark Blue S.....	Mz .....	WCh
Alizarine D G, GI .....	P K.....	WCh
Alizarine Green paste.....	Pk .....	WCh
Alizarine Green B.....	Bs .....	WCh
Alizarine Green B.....	A .....	WA
Alizarine Green C, SS.....	By, Rice .....	WCh
Alizarine Green CE paste, CG, CK....	By.....	WGS, WCh
Alizarine Green DW.....	P K.....	WCh
Alizarine Green EB, G.....	Bs .....	WCh
Alizarine Green F.....	A .....	WACH
Alizarine Green F powder.....	Sch .....	WCh
Alizarine Green KO.....	By .....	Sulphur
Alizarine Green S paste.....	Mz .....	WCh
Alizarine Green SE.....	Mz, PK .....	WCh
Alizarine Green S pat.....	Math .....	WCh
Alizarine Grenat R.....	Mz .....	WCh
Alizarine Indigo DO.....	Mz .....	CD
Alizarine Indigo S paste.....	P K.....	WCh
Alizarine Irisol R.....	By.....	WGS, WCh
Alizarine Lanacyl Blue BB, 3B.....	Math .....	WCh
Alizarine Lanacyl Navy Blue B pat....	Math .....	WA
Alizarine Lanacyl Blue R.....	Math .....	WA
Alizarine Lanacyl Violet B pat.....	Math .....	WA
Alizarine Maroon paste .....	P K.....	WCh
Alizarine Olive OD.....	At .....	WCh
Alizarine Orange A paste.....	P K.....	WCh

## 246      YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Orange AO, AOP.....	B A Co.....	WCh
Alizarine Orange DF, DG, DR.....	Mz .....	CD
Alizarine Orange G.....	Mz, By .....	WCh
Alizarine Orange N.....	Mz .....	WCh
Alizarine Orange powder .....	Mz .....	WCh
Alizarine Orange P.....	Mz .....	WCh
Alizarine P.....	B A Co.....	WCh
Alizarine Red D4B.....	Mz .....	CD
Alizarine Red E D.....	Bs .....	WCh
Alizarine Red F paste.....	Mz .....	WCh
Alizarine Red GG.....	P K.....	WCh
Alizarine Red PS.....	By .....	WCh
Alizarine Red RG.....	Mz .....	WCh
Alizarine Red RX.....	Mz .....	WCh
Alizarine Red S.....	Mz, PK.....	WCh
Alizarine Red SDG.....	Mz .....	WCh
Alizarine Red WB.....	By, Pk .....	WCh
Alizarine Red WS.....	Mz .....	WCh
Alizarine Red X.....	Mz .....	WCh
Alizarine Red D. 1B new.....	Mz .....	WCh
Alizarine Red No. 1 powder.....	Mz .....	WCh
Alizarine Red 2A.....	Mz .....	WCh
Alizarine Red 2ABL, BL.....	Mz .....	WCh
Alizarine Red 2 BW.....	Mz .....	WCh
Alizarine Red 1 W.....	Mz .....	WCh
Alizarine Red 1 WS.....	Mz .....	WCh
Alizarine Red 2 A W.....	Mz .....	WCh
Alizarine Red 2W.....	Mz .....	WCh
Alizarine Red 2 WS.....	Mz .....	WCh
Alizarine Red 3 GW.....	Mz .....	WCh
Alizarine Red 3W.....	Mz .....	WCh
Alizarine Red 3 WS.....	Mz .....	WCh
Alizarine Red 4 FW.....	Mz .....	WCh
Alizarine Red 4 WS.....	Mz .....	WCh
Alizarine Red 5 WS.....	Mz .....	WCh



# LIST OF DYESTUFFS, MAKERS AND METHODS. 247

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Saphirol SE.....	By .....	WGS
Alizarine Saphirol B.....	By .....	WGS
Alizarine Scarlet DG, D2R.....	Mz .....	CD
Alizarine Sky Blue B.....	By .....	WGS
Alizarine Violet extra .....	At .....	WCh
Alizarine Violet G paste.....	Mz .....	WCh
Alizarine Violet N.....	St .....	WCh
Alizarine Violet B.....	Bs .....	WCh
Alizarine Violet paste .....	Mz .....	WCh
Alizarine Viridine paste FF.....	By .....	WCh
Alizarine Yellow A paste.....	P K.....	WCh
Alizarine Yellow C.....	Bs .....	WCh
Alizarine Yellow DG, DR, D3G, DOO.....	Mz .....	CD
Alizarine Yellow FS.....	Klp .....	WCh
Alizarine Yellow GG, GGW, N.....	Mz .....	WCh
Alizarine Yellow GG.....	A .....	WCh
Alizarine Yellow GG.....	Lev .....	WGS
Alizarine Yellow LW.....	P K.....	WCh
Alizarine Yellow OD, paste, R, RW powder .....	Mz .....	WCh
Alkali Blue.....	A, Brs, Bs, By, Sch, Kell, Klp, Math, O, PK, SS.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 7B. BBR, R, R concextra .....	Mz.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 6B90 per cent., 6B, 100 per cent., R, 2R, 3R .....	Math.	
Alkali Blue 2B, 3B, 4B, 5B, 6B, H6B, H5BOO, H3BOO .....	O.	
Alkali Blue D.....	A.	
Alkali Blue 4B.....	Jb.	
Alkali Blue XG.....	Br. S.	
Alkali Brown .....	Bs .....	CD
Alkali Brown R.....	L P.....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Alkali Fast Green B, G.....	By .....	WGS
Alkali Fast Red B, G.....	Mz .....	WGS
Alkali Green .....	Br. S.	
Alkali Red .....	Bs.	
Alkali Red B, R.....	Mz.	
Alkali Violet CA.....	PK.	
Alkali Violet R.....	By.	
Alkali Yellow, R.....	Bs.	
Alpine Blue .....		WGS
Alsace Brown B, BB, BR, LL, R.....	At .....	CD
Alsace Gray .....	Fi.	
Alsace Green, J.....	FTM.	
Amaranth .....	Mz, Math.....	SS
Amaranth B.....	Math .....	WGS, SS
Amaranth E, O.....	Mz .....	WGS, SS
Amaranth extra .....	SS.	
Amidoazol Cutch.....	H .....	CD
Amidoazol Drab.....	H .....	CD
Amidoazol Gray.....	H .....	CD
Amidoazol Green B.....	H .....	CD
Amido Fast Black.....	Mz .....	Printing
Amido Fast Brown.....	Mz .....	Printing
Amido Naphthol Black 4 Bex, 6B, S, R.....	Mz .....	WGS
Amido Naphthol Red 2B, 6B, G.....	Mz .....	WGS
Anil Blue R.....	K.	
Aniline Brown .....	Fi.	
Aniline Green .....	Math .....	WGS, CT
Aniline Orange .....	Math .....	CT
Aniline Yellow .....	Bt.....	WGS, SS, CT
Aniline Yellow extra .....	Klp.	
Aniline Yellow NT.....	Math .....	CD
Anisoline .....	Math .....	CD
Anisol Red .....	Mo.....	WGS, SS, CD
Anthra Alizarine Bordeaux.....	At .....	WACH

LIST OF DYESTUFFS, METHODS AND MAKERS. 249

Name of Dye.	Agent or Maker.	Dye Method.
Anthra Alizarine Carmoisine.....	At .....	WACH
Anthra Alizarine Green CG.....	At .....	WACH
Anthra Alizarine Red B.....	At .....	WACH
Anthra Alizarine Yellow G.....	At .....	WACH
Anthracene Acid Black C.....	Klp .....	WCh
Anthracene Acid Black LW, SF, ST, SW .....	Math .....	WGSCh
Anthracene Acid Brown B, G, N, R, SW pat, v .....	Math..	WGS, WCh, SA
Anthracene Black .....	.	.
Anthracene Blue C.....	Math .....	WCh
Anthracene Blue S, SWX, WB, WG, WR, SWGG extra.....	PK .....	WCh
Anthracene Brown paste .....	Ba, Co, By.....	WCh
Anthracene Brown G paste, R paste...	By .....	WCh
Anthracene Brown O paste.....	Mz .....	WCh
Anthracene Brown RR.....	Rs .....	CDv
Anthracene Chrome Black, F, 5B, FE.	Math .....	WCh
Anthracene Chrome Brown, D.....	Math.....	WCh
Anthracene Chrome Green.....	Math.....	WCh
Anthracene Chrome Red, A.....	Math.....	WCh
Anthracene Chrome Violet, B, R.....	Math.....	WCh
Anthracene Croceine B, G.....	F .....	WCh
Anthracene Dark Blue .....	PK .....	WCh
Anthracene Green, or Coeruleine.....		WCh
Anthracene Red .....	By, I, Klp.....	WGS
Anthracene Red B.....	HS .....	WGS
Anthracene Scarlet OR.....	HS .....	WGS
Anthracene Yellow paste.....	By .....	WCh
Anthracene Yellow BN, C, GG, R.....	Math .....	WGS, WCh
Anthracene Yellow GN.....	Bs .....	WCh
Anthracite Black BR.....	Math .....	WGS
Anthracyl Chrome Brown D.....	D .....	WACH
Anthracyl Chrome Gray.....	D .....	WACH
Anthracyl Chrome Green.....	D .....	WACH

## 250 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Anthracyl Chrome Olive.....	D .....	WACH
Anthragallol, or Anthracene Brown...	Math .....	WCh
Anthramine Yellow .....	At .....	WCh
Anthraquinone Blue SR.....	PK .....	WGSCh
Anthraquinone Violet.....	PK .....	WGS
Apollo Red .....	Kell .....	WGS
Arabian Black.....	Bal .....	CD
Archil Red 3 VN.....	P .....	WGS
Archil Substitute N powder .....	Math .....	WGS
Archil Substitute G Powder .....	Mz .....	WGS
Archil Extract, 1, 2, 3, 4.....	Math .....	WGS
Archil Extract extra and conc.....	Mz .....	WGS
Arnica Yellow .....	Kell.	
Atlanta Yellow 103.....	HS .....	CD
Atlas Orange .....	BrS .....	WGS, SS
Atlas Red .....	BrS .....	WGS, SS
Atlas Scarlet .....	By .....	WGS
Auracine G.....	By .....	CT
Auramine G.....	G, Klp, PK....	WG, CT
Auramine O, I II, conc.....	G, Klp, Mz, PK, WG, CT	
Aurantia .....	A .....	SS
Aureoline .....	Klp .....	CD
Aureosine .....		
Aurine .....	Gr, Lo, LP, Mo, RD.	
Auronal Black.....	TM .....	Sulphur
Aurophenine .....	Mz .....	CD
Aurophosphine G.....	A .....	SA
Aurotine .....	ClCo.	
Autogene Black.....	SS .....	Sulphur
Autogene Brown BG.....	SS .....	Sulphur
Autogene Gray.....	SS .....	Sulphur
Azaleine .....		
Azarin R, S.....	Mz .....	Lakes
Azin Blue, alcohol soluble .....	Bs.	
Azindon Blue G, R.....	Mz .....	CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 251

Name of Dye.	Agent or Maker.	Dye Method.
Azin Green GO, BO, TO.....	Mz .....	WGS, CT
Azin Scarlet G conc. GO.....	Mz .....	WG, SA, CT
Azo Acid Black B, BL, G, GL, 3BL, R, TL, extra conc., TL, No. 2 extra..	Mz .....	WGS
Azo Acid Blue B, .....	Mz .....	WGS
Azo Acid Brown .....	By .....	WGS
Azo Acid Carmine B.....	Mz .....	WGS
Azo Acid Fuchsine B, G.....	Mz .....	WGS
Azo Acid Magenta B, G, B conc, G conc. ....	Mz .....	WGS
Azo Acid Red B.....	Mz .....	WGS
Azo Acid Ruby, 2B.....	Bs .....	WGS
Azo Acid Violet 4R R extra.....	By .....	WGS
Azo Acid Yellow .....	A, NYB .....	WGS
Azo Alizarine Yellow CG.....	DH .....	Printing
Azo Black O.....	Mz .....	WGS, SS
Azo Black Blue .....	O.	
Azo Blue .....	Mz, By, A, .....	CD
Azo Bordeaux.....	Sch, By, O.....	WGS
Azo Brown N.....	Bs, Math.....	WGS
Azo Brown O.....	Mz .....	WGS
Azo Brown V.....	Mz .....	WGS
Azo Brown Y.....	P .....	WGS
Azo Carmine G paste.....	P K.....	WGS
Azo Carmine G.....	A .....	WGS
Azo Cardinal G.....	A .....	WGS
Azo Chromine .....	Kell .....	WGS
Azo Coccine 7B, or Cloth Red.....	A .....	WGS
Azo Coccine G, or Tropaeoline 0000...		WGS
Azo Coccine 2R.....	A .....	WGS
Azo Cochineal .....	By .....	WGS
Azo Coralline.....	Bs .....	WGS
Azo Corinth .....	O.	
Azo Crimson L, S.....	By .....	WGS
Azo Dark Blue .....	O .....	CD

# 252 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Azo Diphenyl Blue .....		
Azo Eosine .....	By .....	WGS
Azo Flavine .....	Bs, PK.....	WGS, SS
Azophone Black .....	At .....	CD
Azophone Green B, G.....	At .....	CD
Azo Fuchsine B, G, GN, S.....	By .....	WGS
Azo Galleine .....	Kell .....	WCh
Azo Green .....	By .....	WCh
Azo Grenadine S.....	By .....	WGS
Azo Mauve B, R.....	O .....	CD
Azo Merino Black B, 6B.....	C .....	WGS
Azo Merino Blue 3B, G.....	Math .....	WGS
Azo Merino Dark Blue R.....	Math .....	WGS
Azomine Black.....	UI .....	CD
Azomine Yellow.....	UI .....	CD
Azo Orange R.....	Klp .....	CD
Azo Orseille BB.....	Math .....	WGS
Azo Orseille R.....	A.....	
Azo Orselline .....	A, By, O, P K.	
Azophenine Blue R.....	Grie .....	CT
Azopheoxine 2G.....	By .....	WGS
Azophor Black S, DP.....	Mz .....	Printing
Azophor Blue D.....	Mz .....	Printing
Azophor Orange MN.....	Mz .....	Printing
Azophor Orange .....	Mz .....	Printing
Azophor Pink A, Base.....	Mz .....	Printing
Azophor Red PN .....	Mz .....	Printing
Azo Pink BB.....	Mz .....	Printing
Azo Red B, BB, G.....	Bs .....	WGS
Azo Rubinc.....	O, Sch.....	WGS
Azo Rubine .....	O .....	WGS
Azo Rubine A.....	Math .....	WGS
Azo Rubine SG.....	A.....	WGS
Azo Ruby .....	tM, Lev.....	WGS
Azo Ruby S, 2S.....	A .....	WGS

T  
S  
G  
G  
G  
G  
G  
ing  
ing  
VGS  
VGS  
VGS  
VGS  
VGS  
VGS  
VGS

Name of Dye.	Agent or Maker.	Dye Method.
Azo Saffranine .....	Kell .....	WGS
Azo Turkey Red .....	O.	
Azo Violet .....	Mz, A, By, Lev.....	CD
Azo Wool Blue B, SE.....	Math .....	WGS
Azo Wool Violet 4B, 7R.....	Math .....	WGS
Azo Yellow .....	Bt, K, Mz, Klp, O, SS	WGS, SS
Azo Yellow Conc.....	Mz .....	WGS
Azo Yellow M.....	Klp .....	WGS, SS
Azo Yellow N, NR.....	Kell .....	SS
Azo Yellow OR.....	Mz .....	WGS, SS
Azo Benzol Fast Crimson .....	P K.....	WGS
Basel Blue, BB, R paste, S.....	Klp.....	WG, CT
Bavarian Blue alcohol soluble.....	A.	
Bavarian Blue DBF, DSF.....	A .....	SA, CT
Belgium Blue .....	AC.	
Bengal Blue .....	K	
Bengal Deep Black D, 2B.....	SS .....	CDv
Bengal Pink .....	Klp .....	WGS
Benzaline Blue B.....	K .....	CT
Benzal Green, O powder, OO crystals..	O .....	WN, CT
Benzidine Blue .....		
Benzidine Red .....		
Benzindamine .....	NI.	
Benzo Azurine G, 3G.....	Mz, A, By.....	CD
Benzo Azurine R 3R.....	Mz, By .....	CD
Benzo Black .....	Mz, By .....	CD
Benzo Black Blue G, 5G, R.....	Mz, By .....	CD
Benzo Black Brown .....	By .....	CD
Benzo Blue BB, 3B, BX.....	By .....	CD
Benzo Bordeaux 6B.....	By .....	CD
Benzo Brown G, 5R, RC.....	By .....	CD
Benzo Chrome Black B.....	By .....	CD
Benzo Chrome Black Blue, B.....	By .....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Benzo Chrome Brown B, BS, 5G, R, 3RBy	By	CD
Benzo Copper Blue B.	By	CD
Benzo Cyanine B, 3B, R.	By	CD
Benzo Dark Brown	By.	
Benzo Dark Green B, BB, GG.	By	CD
Benzo Fast Black 3B, G.	By	CD
Benzo Fast Blue B, Bn G.	By	CD
Benzo Fast Gray	By	CD
Benzo Fast Orange S.	By	CD
Benzo Fast Pink 2BL.	By	CD
Benzo Fast Red L, GL.	By	CD
Benzo Fast Scarlet 4Bs, 8Bs, 5Bs.	By	CD
Benzo Fast Violet R.	By	CD
Benzo Flavine O. No. 2.	O	CT
Benzo Gray	By	CD
Benzo Green G.	By	CD
Benzo Indigo Blue	By	CD
Benzo Nitrol Brown G, N, 2R.	By	CD
Benzo Nitrol Bordeaux G.	By	CDv
Benzo Olive extra.	By	CD
Benzo Orange R.	A, By	CD
Benzopurpurine B, 4B, 6B, 10B.	Mz, By, A	CD
Benzopurpurine 4Bex conc.	Mz	CD
Benzopurpurine 4B double.	Mz	CD
Benzo Red SG, 10B.	By	CD
Benzo Rhodamine 3B.	By	CD
Benzo Rhoduline Red B, 3B.	By	CD
Benzo Sky Blue	Mz, By, A	CD
Benzo Violet R/L extra.	By	CD
Benzyl Black B, 4B.	Klp	WGS
Benzyl Blue S.	Klp	WGS
Benzyl Bordeaux	Klp	WGS
Benzyl Blue S.	Klp	WGS
Benzyl Green G, B.	Klp	WGS
Benzyl Violet 4B, 10B, 5B.	Klp	WGS



# LIST OF DYESTUFFS, MAKERS AND METHODS. 255

Name of Dye.	Agent or Maker.	Dye Method.
Benzyl Violet .....	Bt, CR, RE, tM,	WGS, SS, CT
Best Magenta Crystals .....	Bt.	
Best Violet, or Brilliant India Dye.....	Bt.	
Biebrich Acid Blue, G, GG.....	K .....	WGS
Biebrich Acid Red B, 4B, 3G.....	K .....	WGS
Biebrich Acid Violet 2B, 6B.....	K .....	WGS
Biebrich Alizarine Black 4BN.....	K .....	WGS
Biebrich Patent Black AN, 4AN, AO 4BN, RO.....	K .....	WGS
Biebrich Patent Jet Black, 3BO.....	K .....	WGS
Biebrich Scarlet .....	K .....	WGS
Bismarck Brown .....	A, CR, F, K, Math, NI. Lh, O, PK, SW....	CT
Bismarck Brown B.....	Klp .....	CT
Bismarck Brown EE.....	Math .....	CT
Bismarck Brown FFG.....	Math .....	CT
Bismarck Brown G.....	Klp .....	CT
Bismarck Brown GG.....	Math, O.....	CT
Bismarck Brown GOO, GOOO.....	O .....	CT
Bismarck Brown R, Y.....	Mz .....	CT
Bismarck Brown ROO, ROOO.....	O .....	CT
Bismarck Brown T.....	Klp .....	CT
Bismarck Brown YS 8049.....	Math .....	CT
Bitter Almond Oil Green .....	Bt .....	WGS, SS, CT
Black Black O.....	Mz .....	WGS, SS
Black Blue O.....	Mz .....	WGS, SS
Blackley Blue .....	Lev .....	SS, CT
Black Soluble in Oil .....	Mz, Math.	
Blue Asozin .....	P .....	WGS
Blue Alcohol Soluble .....	Mz.	
Blue B, BB .....	Mz .....	Printing
Blue BJB .....	P .....	WGS
Blue Black B.....	P K.....	WGS
Blue Black GR, 5G.....	Klp .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Blue Black Diphenyl.....	Kell	CD
Blue BS .....	Math. P.....	WGS
Blue 3BS .....	P .....	WGS
Blue BW.....	O.	
Blue CB, alcohol and water soluble....	Klp.	
Blue extra .....	RD .....	CT
Blue for Silk.....	Math.	
Blue for printing, paste and powder....	Mz.	
Blue for white.....	Kell	SS
Blue G.....	Jy .....	CT
Blue, green shade.....	Mz .....	WGS, SS, CT
Blue Green S.....	P K.	
Blue R.....	Mz .....	Printing
Blue, red shade.....	Mz .....	WGS, SS, CT
Blue T conc.....	Mz .....	WGS, SS
Blue 2111.....	At .....	CD
Blue Black 5534.....	H .....	WGS
Body Blue O .....	Mz .....	WGS, SS, CT
Bordeaux .....	SW .....	CD
Bordeaux B.....	Mz, A, Math, LP....	RF
Bordeaux BL.....	Math .....	WGS, SS
Bordeaux BX.....	By .....	WGS
Bordeaux COV.....	A .....	WGS, CD
Bordeaux DH.....	Klp .....	WGS
Bordeaux Diamine B, S.....	Math .....	CD
Bordeaux extra .....	By .....	WGS
Bordeaux G.....	Bs, By.....	WGS
Bordeaux R extra.....	Mz .....	WGS
Bordeaux S.....	A, RF.....	WGS
Bottle Green .....	Bch.	
Braxeline .....	At.	
Brahma Orange .....	Z.	
Brahma Red B, BB, 6B.....	Z.	
Bright Blue extra.....	Mz .....	CD
Bright Blue O.....	B L.....	CD

# LIST OF DYESTUFFS, MAKERS AND METHODS. 257

Name of Dye.	Agent or Maker.	Dye Method.
Bright Yellow T.....	Mz, PK	CD
Brilliant Acid Carmine 6B.....	O	WGS
Brilliant Acid Green 6B.....	By	WGS
Brilliant Alizarine RR, 5R.....	By	CD
Brilliant Alizarine Blue D, G, R.....	By	WCh
Brilliant Alizarine Blue EM.....	Mz	WCh
Brilliant Alizarine Cyanine G, 3G.....	By	WCh
Brilliant Anthraznol.....	B	WGS
Brilliant Azurine B.....	A, By	CD
Brilliant Azurine 5G.....	Mz, A, By	CD
Brilliant Benzo Green B.....	By	CD
Brilliant Black B.....	P K	WGS
Brilliant Black solution BE, NE, RE..	Math.	
Brilliant Blue .....	Bs.	
Brilliant Blue 7B.....	O.	
Brilliant Blue HB.....	Gt	WGS
Brilliant Bordeaux S.....	A	WGS
Brilliant Carmine .....	NYB	SS
Brilliant Carmine Green.....	Lev	WGS
Brilliant Carmoisine O.....	A	WGS
Brilliant Cochineal 2R, 4R.....	Math	WG
Brilliant Chrome Red, paste.....	By.	
Brilliant Cloth Blue Bex, G.....	K	WAS
Brilliant Congo G, R.....	Mz, A, By	CD
Brilliant Cotton Blue B57.....	Sch	CAI
Brilliant Cotton Blue, greenish.....	By	CT
Brilliant Cresyl Blue 2B.....	L	CT
Brilliant Crimson B, O, N.....	Mz	WGS, CT
Brilliant Crocein blue, and yellow.....	Mz	WGS, SS, CAI
Brilliant Croceine AZ.....	Math	WGS
Brilliant Crocein B, BB.....	Mz	WGS, SS
Brilliant Croceine 3B.....	Mz, By, Math.	WGS, SS
Brilliant Croceine BOO.....	Math	WGS
Brilliant Croceine 5B.....	Mz, Math	WGS, SS

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Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Croceine 6B, 7B, 9B, 10B....	Math .....	WGS
Brilliant Croceine D.....	Mz .....	WGS
Brilliant Croceine M, MOO.....	Math .....	WGS
Brilliant Croceine MOO.....	NYB .....	SS
Brilliant Croceine R.....	Mz, Math .....	WGS
Brilliant Croceine ROO.....	Math .....	WGS
Brilliant Croceine Scarlet D.....	Mz .....	WGS
Brilliant Cyanine Blue R.....	By .....	WCh
Brilliant Dianil Red R, R Conc.....	Mz .....	CD
Brilliant Diazine Blue B, B.....	K. ....	
Brilliant Direct Navy Blue B.....	Bs .....	CD
Brilliant Direct Red 249.....	Sch .....	CD
Brilliant Geranine B, 3B.....	By .....	CD
Brilliant Green.....	Mz, By, CJ, CR, F, K, Klp, Math, PK, NI, O, PS, RE, tM, Bt....	WGS, SS, CT,
Brilliant Green crystals, C.....	Mz .....	WGS, CT
Brilliant Green crystals extra, extra N, powder superior, 1a, No. 12.....	Mz .....	WN, SA, CT
Brilliant Green O crystals.....	O .....	WN, CT
Brilliant Indigo Carmine sub.....	Lev .....	WGS
Brilliant Lake Scarlet G, R, 2 R.....	Mz .....	WGS, SS
Brilliant Milling Green B.....	C .....	WGS
Brilliant Milling Scarlet 2 B.....	Lev .....	WGS
Brilliant Opaline.....	Gb. ....	
Brilliant Orange G.....	Mz, A.....	WGS, SS
Brilliant Orange O, R.....	Mz .....	WGS, SS
Brilliant Orcelleine, pat.....	Math .....	WGS
Brilliant Orseille C.....	Math .....	WGS
Brilliant Ponceau G, GG.....	Math .....	WGS
Brilliant Ponceau 4R.....	By .....	WGS
Brilliant Ponceau 5R.....	Bs, By, Math.....	WGS
Brilliant Purpurine 10B.....	A .....	CD

# LIST OF DYESTUFFS, MAKERS AND METHODS. 259

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Purpurine R.....	Mz, A, By.....	CD
Brilliant Purpurine 4R.....	R F.....	CD
Brilliant Purpurine 5B.....	RF.....	CD
Brilliant Red.....	Sch.....	WGS
Brilliant Red D.....	Klp.....	WGS
Brilliant Red Congo G.....	Mz, A, By.....	CT
Brilliant Rhoduline Violet R.....	By.....	CT
Brilliant Rubine O.....	Mz.....	WGS, SS
Brilliant Saffranine G.....	A.....	WGS, CT
Brilliant Scarlet.....	Lev.....	
Brilliant Scarlet G, GG, R, RR, 3R, 4R, 6R, T.....	Math.....	WGS
Brilliant Scarletine.....	H.....	WGS
Brilliant Scarlet N3R.....	SS.....	WGS
Brilliant Sky Blue G.....	Bs.....	CD
Brilliant Sulfon Azurine R.....	By.....	
Brilliant Sulphon Red B.....	By.....	WGA
Brilliant Wool Blue B extra.....	By.....	SS, WGS
Brilliant Yellow.....	Mz, A, By, SB, SCH, tM.....	WGS, SS
Brilliant Yellow I.....	H.....	WGS
Brilliant Yellow S.....	PK.....	WGS, SS
Bromofluoresceic Acid Crystals.....	Mz.....	Lakes
Bromofluoresceic Acid AG, A3G, A6G.....	Mz.....	Lakes
Bromofluoresceic Acid AL.....	Mz.....	Lakes
Bromofluoresceic Acid BA, conc.....	Mz.....	Lakes
Bromofluoresceic Acid BL Blue.....	Mz.....	Lakes
Bromofluoresceic Acid BL Yellow.....	Mz.....	Lakes
Bronze Blue J.....	PK.....	
Bronze Diamine G.....	Math.....	CD
Brown BBX.....	BrS.....	CD
Brown JE, JEEE.....	P.....	WGS
Brown M.....	P.....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Brown N.....	P .....	WGS
Brown SC.....	S W.....	CD
Brown SDM, SDP.....	S S.....	CD
Brown Y.....	S W.....	CD
Brown for Leather O.....	Mz .....	Tannin
Buffalo Black 4B, 8B.....	Sch .....	WGS
Buffalo Brown R.....	Sch .....	CT
Buffalo Bordeaux .....	Sch .....	CD
Buffalo Chrome Black.....	Sch .....	WGSch
Buffalo Crimson B.....	Sch .....	CD
Buffalo Rubine .....	Sch .....	CD
Buffalo Scarlet 4B.....	Sch .....	CD
Buffalo Thiol Black GB.....	Sch .....	Sulphur
Buffalo Violet 4R.....	Sch .....	CD
Butter Yellow.....	HM .....	
Cachou de Laval S.....	P .....	Sulphur
Cachou Diamine .....	Math .....	CD
Calico Yellow, GG, 3G, 4G.....	Kell .....	Printing
Campanuline .....	A .....	CD
Canarine .....	Klp.	
Capri Blue GN.....	Mz, Bs.....	CT
Capri Green B, G, GG.....	Mz .....	CT
Carbazol Yellow W.....	P K.....	CD
Carbid Black, BO, R. RO.....	Klp .....	CD
Carbon Black BW.....	K .....	CD
Cardinal .....	Mz .....	WG, SA, CT
Cardinal B, extra .....	SW .....	CD
Cardinal Red S.....		
Carmoisine .....	A, By, PK, SS....	WGS
Carmoisine conc.....	A, K, SS.....	WGS
Carnotine .....	ClCo .....	CD
Caroubier .....	Klp.	
Cashmere Black B, 6B, T.....	By .....	WGS
Cerasine .....	Klp.	
Cerasine Blue LC.....	Math.	

# LIST OF DYESTUFFS, MAKERS AND METHODS. 261

Name of Dye.	Agent or Maker.	Dye Method.
Cerasine Orange G.....	Math.	
Cerasine Red, A.....	Math.	
Cerasine Yellow, G T.....	Math.	
Cerise .....	Mz, Bt, Klp, Math, NI, PK, PS, SS, WG, SA, CT	
Ceretine Orange C, extra.....	O .....	WGS
Chestnut Brown .....	A .....	CD
Chicago Blue B, 4B, 6B, R, 2R, 4R, RW.A .....		CD
Chicago Gray .....	Kell .....	CD
Chicago Orange, G, extra, 3G.....	Kell .....	CD
China Blue .....	Mz, A, BrS, By, PN, WGS, SS, CT	
China Blue R, No. 1, 2.....	Math.	
China Blue 71115 .....	KB.	
China Green crystals .....	Kell.	
Chinoline Blue.....	P K.	
Chinoline Green .....	A.	
Chinoline Red.....	A,	
Chinoline Yellow.....	Mz, BrS, By, PK, WGS	
Chloramine Blue 6B.....	S .....	CD
Chloramine Brown C, G.....	By .....	CD
Chloramine Orange G.....	By .....	CD
Chloramine Red 8BS.....	By .....	CD
Chloramine Violet.....	By .....	CD
Chloramine Yellow GG.....	By .....	CD
Chloranisidine .....	B .....	Lakes
Chlorantine Blue 2B.....	Klp .....	CD
Chlorantine Lilac .....	Klp, PK.....	CD
Chlorantine Red 8B.....	Klp .....	CD
Chlorazol Blue 6G, R, 2R, 6B.....	H .....	CD
Chlorazol Brown A, B, C, R.....	H .....	CD
Chlorazol Green B, Y.....	H .....	CD
Chlorazol Heliotrope.....	H .....	CD
Chlorazol Yellow G, 3G, Y.....	H .....	CD

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Name of Dye.	Agent or Maker.	Dye Method
Chlorine Blue R.....	Klp .....	CT
Chlorophenine G, O, R, Y.....	ClCo .....	CD
Chlorophenine Orange, AA, R.....	ClCo .....	CD
Chromanil Black RF, BF, 2BF, 3BF....	A .....	CD
Chromanil Brown GG, R, 2G.....	A .....	CD
Chromate Black 6B, TB4B.....	A .....	WGSCh
Chromazine Violet .....	Sch .....	WCh
Chromazo Maroon .....	Sch .....	WCh
Chromazo Red RB.....	Sch .....	WCh
Chromazo Yellow GR.....	Sch .....	WCh
Chromazon Blue B, R .....	Kell .....	WGS
Chromazon Red .....	Kell .....	WGS
Chrome Azurine S.....	S .....	WCh
Chrome Black.....	Jy, SW.....	WGS
Chrome Black, B, T.....	Mz .....	WGSCh
Chrome Blue.....	Jy, By, Math.....	WCh
Chrome Blue B.....	Mz .....	WCh
Chrome Blue 2B, 4B, BN, PE. R, 2R, 3R, No. 470.....	Kell .....	WCh
Chrome Bordeaux .....	By .....	WCh
Chrome Brown G.....	Kell .....	WCh
Chrome Brown BO, RO.....	Mz .....	WCh
Chrome Fast Black B.....	A .....	WCh
Chrome Fast Black F.....	Klp .....	WGSCh
Chrome Fast Red B, GR.....	A .....	WGSCh
Chrome Fast Yellow G, 2G, R.....	A .....	WCh
Chrome Green .....	By .....	WCh
Chrome Leather Black B C.....	Math.	
Chrome Orange .....	By .....	WCh
Chrome Patent Black TB, TG, TR, T..	K .....	WGS
Chrome Prune .....	By .....	WCh
Chrome Red R.....	HS .....	WCh
Chrome Red paste .....	By .....	WCh
Chrome Ruby paste .....	By .....	WCh



# LIST OF DYESTUFFS, MAKERS AND METHODS. 263

Name of Dye.	Agent or Maker.	Dye Method.
Chrome Violet powder .....	By, Kell.	WCh
Chrome Violet paste ..	By	WCh
Chrome Yellow .....	H S, N I.	WCh
Chrome Yellow D.....	By	WCh
Chrome Yellow G.....	By, HS.	WCh
Chrome Yellow P.....	Kell	WCh
Chrome Yellow R.....	SS	WACH
Chromine G.....	K	WCh
Chromine Blue B, T.....	HS	WCh
Chromium Patent Black DG, DGG....	K	WGSCh
Chromocyanine .....	DH	Printing
Chromogen I.....	Mz	WGSCh
Chromotrop 2B, 6B, 8B, 10B 2R....	Mz	WGS
Chromotrop FB, S, SB, SN, SR. F. 4B.	Mz	WGSCh
Chromotrop Blue A.....	Mz	WGSCh
Chrysamine .....	By	CD
Chrysamine G.....	Mz, A, By	CD
Chrysamine GG.....	By	CD
Chrysamine R.....	Mz, A, By	CD
Chrysaniline .....		
Chrysoidine .....	Mz, A, By, K, PK, Lh, WN, SA, CT	
Chrysoidine AG, FF.....	Math	WN, SA, CT
Chrysoidine G.....	Kell, Klp.	WN, SA, CT
Chrysoidine R.....	Mz, Kell, Klp, Math, WN, SA, CT	
Chrysoidine Y, YY.....	Mz, Sch, Math, WN, SA, CT	
Chrysoidine Brown .....	Math	WN, SA, CT
Chrysoline .....	Klp, Mz, PK, SS, tM	
Chrysoline .....	Kell	WGS
Chrysophenine R.....	Mz, A, By	CD
Chrysophenine conc.....	Mz	CD
Chrysophenine G.....	Mz	CD

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Name of Dye.	Agent or Maker.	Dye Method.*
Cinereine .....	SS.	
Cinnabar Scarlet.....	BK.	
Cinnamine S.....	W.	
Cinnamon Brown .....	PS .....	WGS, CT
Citronine .....	Mz, BrS, Fi, Klp, O, SS .....	WGS, SS
Citronine A.....	Mz .....	WGS, SS
Citronine AA, 2A, extra, AHE NE....	SS .....	SA
Citronine G, GOO, GOOO.....	O.	
Citronine NE.....	SS .....	SA
Citronine Diphenyl G.....	Kell .....	CD
Citronine Diphenyl GOO.....	O .....	SS
Claret Red.....	Sch .....	WGS
Claret Red B, 3B, G, GR, R, B extra O, S.....	Mz .....	WGS
Clayton Aurotine .....	ClCo.	
Clayton Carnotine.....	ClCo .....	WGS
Clayton Cloth Red .....	ClCo .....	WGS
Clayton Fast Gray D.....	ClCo .....	Sulphur
Clayton Red .....	ClCo.	
Clayton Yellow, G.....	ClCo .....	CD
Clematine .....	Kell .....	CT
Cloth Blue O.....	Mz .....	WGS, SS, CT
Cloth Brown reddish, yellowish.....	Mz, By .....	WCh
Cloth Orange .....	Mz, By .....	
Cloth Red .....	Mz .....	WCh
Cloth Red, see Stanley Red.....	ClCo.	
Cloth Red B.....	Mz, Bs, By, O....	WCh
Cloth Red BA.....	A .....	WCh
Cloth Red 3B extra.....	By .....	WCh
Cloth Red BO, FRBO.....	O .....	WCh
Cloth Red G.....	Mz, B, O.....	WCh
Cloth Red G extra, 3G extra.....	By .....	WCh
Cloth Red GA, 3GA.....	A .....	WCh

# LIST OF DYESTUFFS, MAKERS AND METHODS. 265

Name of Dye.	Agent or Maker.	Dye Method.
Cloth Red GO, 3GO.....	O .....	WCh
Cloth Red O.....	Mz .....	WCh
Cloth Red OB.....	O .....	WCh
Cloth Red R.....	Bs .....	WCh
Cloth Scarlet, G, R.....	K .....	WGS
Coccein 3B.....	SS .....	WGS
Coccinin, B.....	Mz .....	WGS
Cochineal Red A.....	P K.....	WGS
Cochineal Scarlet G.....	Sch .....	WGS
Cochineal Scarlet PS.....	By .....	WGS
Cochineal Scarlet 2R, 4R.....	Sch .....	WGS
Cochineal Substitute .....	Klp .....	WGS
Coelestine Blue B.....	By .....	CT
Coeruleine AB, S.....	Mz .....	WCh
Coeruleine S powder or paste.....	Mz, By, Klp, PK..	WCh
Coeruleine SW, powder or paste .....	Mz, By .....	WCh
Cold Black, BR.....	A .....	CD
Columbia Black B, BB, FB, R, FF.....	A .....	CD
Columbia Black FF extra, FB strong, F2B, 2BX, 2BW, EA, extra WA, extra .....	A .....	CD
Columbia Black Blue G.....	A .....	CD
Columbia Black Green D.....	A .....	CD
Columbia Blue G, R.....	A .....	CD
Columbia Brown R.....	A .....	CD
Columbia Chrome Black BB.....	A .....	CD
Columbia Fast Blue 2G.....	A .....	CD
Columbia Fast Scarlet 4B.....	A .....	CD
Columbia Green .....	A .....	CD
Columbia Orange R.....	A .....	CD
Columbia Red 8B, 6B, 4B, 2B.....	A .....	CD
Columbia Violet R.....	A .....	CD
Columbia Yellow .....	A .....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Concentrated Cotton Blue R, 2R, 1, 2.		
3, 4, B.....	Mz.....	WGS, SS, CA1
Congo .....	Mz, A, By.....	WN, CD
Congo B.....	SS.	
Congo BB.....	A, By.....	CD
Congo 3B, BX, 2BX.....	A.	
Congo G R.....	A, By.	
Congo Blue BX, R, 2B.....	A .....	CD
Congo Brown G, R.....	A .....	CD
Congo Corinth B, G.....	A, By.....	CD
Congo Fast Blue B, R.....	A .....	CD
Congo GR.....	A, By.....	CD
Congo Orange G.....	A .....	CD
Congo Orange R.....	Mz, A, By .....	CD
Congo P, Pure Blue .....	A .....	CD
Congo 4 R.....	Mz, A, By .....	CD
Congo Red .....	Mz, Sch, Klp, By, A.	CD
Congo Rubine .....	A .....	CD
Congo Violet .....	A .....	CD
Congo Yellow paste .....	A. By.....	CD
Congress Red FEN.....	NI .....	CD
Coomassie Black.....	Lev .....	CWD
Coomassie Blue .....	Lev .....	CWD
Coomassie Wool Black BA, conc.....	Lev .....	WGS
Copper Black S.....	Mz .....	WGS, Dev
Copper Blue B, B extra.....	Mz .....	WGS, Dev
Copper Red.....	.....	WGS, Dev
Coralline .....	LP.	
Coreine, AB, AR, RR.....	Klp .....	WCh
Cotton Black B, 3B.....	PK .....	CD
Cotton Blue .....	Mz, Bs.....	CA1
Cotton Blue B, 2BR.....	SW .....	CT
Cotton Blue BI.....	HS .....	WGS, CA1
Cotton Blue 3B, 6B extra.....	Mz, O.....	WGS, SS, CT
Cotton Blue O.....	Kell.	

# LIST OF DYESTUFFS, MAKERS AND METHODS. 267

Name of Dye.	Agent or Maker.	Dye Method.
Cotton Blue OO extra.....	O .....	CT
Cotton Blue R.....	PK, SS.....	CT
Cotton Bordeaux .....	PK .....	CD
Cotton Brown .....	PK .....	CD
Cotton Brown 3G, R.....	ClCo .....	CD
Cotton Brown N.....	Math .....	CD
Cotton Brown R, G.....	P K.....	CD
Cotton Dark Brown B.....	A C.....	CD
Cotton Green CG.....	A .....	CD
Cotton Navy Blue CR.....	AC .....	CD
Cotton Orange G, R.....	P K.....	CD
Cotton Ponceau .....	BK.....	
Cotton Red, 4B.....	P K.....	CD
Cotton Scarlet .....	PK .....	CAe
Cotton Scarlet 3B.....	Sch, K.....	SA, CT
Cotton Scarlet O.....	Mz .....	WN, SA, CT
Cotton Scarlet, yellowish.....	Math .....	SA, CT
Cotton Yellow G, GB, R.....	PK .....	CD
Cresotine Yellow G, R.....	Mz, A, By, O.....	CD
Cresyl Blue BB, 6B, BBSO, RR.....	Bs .....	CT
Cresyl Fast Violet B, BB.....	Bs .....	CT
Cresyl Green GG.....	Bs .....	CT
Cresyl Violet BB.....	Bs .....	CT
Criterion Blue G.....	At .....	WGS
Croceine AZ, X.....	Math.....	
Croceine B, 3B.....	Sch .....	WGS, SS
Croceine 3BX .....	By, K.....	WGS
Croceine Orange .....	By, K.....	WGS
Croceine Scarlet 3B.....	Sch, By K....	WGS, CD
Croceine Scarlet 4BX.....	K .....	WGS
Croceine Scarlet 7B.....	By .....	WGS
Croceine Scarlet 8B.....	By, K.....	WGS
Croceine Scarlet 10B.....	By .....	WGS
Croceine Scarlet O extra.....	K .....	WGS
Cross Dye Black B, 4B, 6B, .....	H .....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Cross Dye Black RT.....	H .....	Sulphur
Cross Dye Drab .....	RH .....	CD
Crow Black .....	Mz, PK .....	CD
Crumpsall Direct Fast Brown B, M, O. Lev .....	Lev .....	CD
Crumpsall Fast Yellow YYFD.....	Lev .....	CD
Crumpsall Yellow .....	Lev .....	WGS
Crystal Ponceau .....	A, PK.....	WGS
Crystal Ponceau 6R .....	Mz, Math .....	WGS
Crystal Scarlet 6R.....	Mz, Math.....	WGS, SS
Crystal Violet 5B.....	Math,	
Crystal Violet 5BO.....	Klp .....	WGS, SS, CT
Crystal Violet O.....	Mz, PK .....	WN, SA
Cuba Black R.....	O .....	CD
Cumidine Ponceau .....	A, PK.....	WGS
Cumidine Red .....	A, PK.....	WGS
Cupranil Brown B R.....	Klp .....	CD
Curcumeine extra .....	A .....	WGS
Curcumine .....	O .....	WGS, SS
Curcumine S, S extra.....	Mz, A, By.....	CD
Curcumine Substitute .....	SS .....	WGS
Curuphenine .....	ClCo .....	WG
Cutch Brown D.....	Mz, N.....	WG, SA, CT
Cutch Brown D.....	ClCo .....	CD, WGS
Cutch Brown G.....	Mz .....	WG, SA, CT
Cutch Brown GG.....	BrS .....	CD
Cutch Brown O, R, VY.....	ClCo .....	CD, WGS
Cyanine B.....	Mz .....	WGS, SS
Cyanol extra, BB, FF, C.....	Math .....	WGS
Cyanol Fast Green G.....	Math .....	WGS
Cyanol Green B, CG, 6G.....	Math .....	WGS
Cyanosine .....	Klp.	
Cyanosine alcohol soluble .....	Mz.	
Cyanthrol BGA, R, RA, RB, RBA,		
RGA .....	B .....	WGS
Cyklamine .....	Mo .....	WG, SA

# LIST OF DYESTUFFS, MAKERS AND METHODS. 269

Name of Dye.	Agent or Maker.	Dye Method.
Cyprus Blue R.....	A .....	WGS Copper
Cyprus Green B.....	A .....	WGS Copper
Dahlia .....	.....	WGS, SS, CT
Dahlia for white .....	Kell .....	SS
Dark Blue .....	Mz, PK.....	WGS
Dark Brown .....	SW .....	CD
Dark Brown M, MB.....	Mz .....	WG, SA, CT
Dark Green .....	PK .....	WGS
Dark Green 682.....	BrS .....	CD
Deep Wool Black 2B, 3B.....	A .....	WG
Delphine Blue B, B conc.....	Mz, S .....	WCh
Delta Purpurine 5B.....	Mz, By .....	CD
Delta Purpurine 7B.....	Mz, A, By.....	CD
Delta Purpurine G.....	By .....	CD
Diamine Azo Black B, BB pat.....	Math .....	CD
Diamine Azo Blue 54, 55.....	Math .....	CD
Diamine Azo Blue R, RR, pat.....	Math .....	CD
Diamine Black B, BH, BO, HW, RO, BX, RMW .....	Math .....	CD
Diamine Black Blue B.....	Math .....	CD
Diamine Black Green N.....	Math .....	CD
Diamine Blue B, 2B, 3B, BG, BX, C4B, 6G, C4R, LG, C2R, LR, NC, RW, 3R, SRX, 50, 52, 53, 55, AB, AZ....	Math .....	CD
Diamine Blue Black E, 72592, R, RL.....	Math .....	CD
Diamine Bordeaux B, S.....	Math .....	CD
Diamine Brilliant Blue G.....	Math .....	CD
Diamine Brilliant Scarlet S.....	Math .....	CD
Diamine Bronze B, C, SF.....	Math .....	CD
Diamine Brown B, GG, 3G, M, OO, QQ, V, 31, 32, 33, 34, 35, 36, 37.....	Math .....	CD
Diamine Catechine B, G, pat. 3G.....	Math .....	CD
Diamine Catechu .....	Math .....	CD
Diamine Cutch .....	Math .....	CD
Diamine Cyanine B, 3B, R.....	Math .....	CD
Diamine Dark Blue B, R.....	Math .....	CD

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Name of Dye.	Agent or Maker.	Dye Method
Diamine Dark Green.....	Math	CD
Diamine Deep Blue RB.....	Math	CD
Diamine Deep Dark Blue B, R.....	Math	CD
Diamine Fast Blue C, FFB, FFG.....	Math	CD
Diamine Fast Brown G.....	Math	CD
Diamine Fast Red, F.....	Math	CD
Diamine Fast Yellow A, AR, B. FF.....	Math	CD
Diamine Gold .....	Math	CD
Diamine Gold Yellow .....	Math	CD
Diamine Gray G.....	Math	CD
Diamine Green B, G.....	Math	CD
Diamine Hellotrope G.....		
Diamine Jet Black CR, OO, 4D, RB, SE, SOOO, JEL.....	Math	CD
Diamine Milling Black B, FG extra.....	Math	CD
Diamine New Blue G, P, R.....	Math	CD
Diamine Nitrazol Black, B.....	Math	CD
Diamine Nitrazol Brown B, BD, T, G, RD .....	Math	CD
Diamine Orange D, DC, G, GC, R, B.....	Math	CD
Diamine Pure Blue, A, FF.....	Math	CD
Diamineral Black B, 3B, 6B.....	Math	CD
Diamineral Blue R.....	Math	CD
Diamineral Brown G.....	Math	CD
Diamine Red B, 3B, 10B, D, NO, 72732	Math	CD
Diamine Rose RD, B extra, BG GD, GGN .....	Math	CD
Diamine Scarlet B.....	Math	CD
Diamine Scarlet 3B.....	HS, Math	CD
Diamine Sky Blue, FF.....	Math	CD
Diamine Steel Blue L.....	Math	CD
Diamine Violet N.....	Math	CD
Diamine Violet Red.....	Math	CD
Diamine WO.....	Math	CD
Diamine Yellow N, paste, R paste, CP, .....	Math	CD



LIST OF DYESTUFFS, MAKERS AND METHODS. 271

Name of Dye.	Agent or Maker.	Dye Method.
Diaminogene B, BR, CF, extra.....	Math .....	CD
Diaminogene Blue BB, G, RA, 2RA, NA .....	Math .....	CD
Diamond Black F, NG, GA, FB, PV, PVB .....	By .....	WGSCb
Diamond Blue 4R.....	UI .....	WGS
Diamond Brown R, 3R.....	By .....	WGSCb
Diamond Fast Acid Black .....	Me.	
Diamond Fast Blue, Red Yellow.....	Me.	
Diamond Flavine G.....	By .....	WCh
Diamond Green SS.....	Mo, By.....	WGSCb
Diamond Green B, G.....	PK.	
Diamond Green crystals.....	K B.	
Diamond Orange paste .....	By.	
Diamond Yellow paste G, R.....	By .....	WCh
Dianil Black AC.....	Mz .....	CDv
Dianil Black CB, CR.....	Mz .....	CDv
Dianil Black E.....	Mz .....	CDv
Dianil Black G.....	Mz .....	CDv
Dianil Black HW.....	Mz .....	CD
Dianil Black N.....	Mz .....	CD
Dianil Black PG, PR.....	Mz .....	CDv
Dianil Black R.....	Mz .....	CDv
Dianil Black RN.....	Mz .....	CD
Dianil Black T.....	Mz .....	CDv
Dianil Blue B, BX, 2BM, 3BM.....	Mz .....	CD
Dianil Blue E, ET.....	Mz .....	CD
Dianil Blue G.....	Mz .....	CD
Dianil Blue R, 2R, 3R, 4R.....	Mz .....	CD
Dianil Blue 2RM, 3RM.....	Mz .....	CD
Dianil Brilliant Black B, G, 2G, R, 2R.....	Mz .....	CD
Dianil Brown B, BD.....	Mz .....	CD
Dianil Brown D.....	Mz .....	CD
Dianil Brown G, 2G, 3GO, 3GI.....	Mz .....	CD
Dianil Brown M.....	Mz .....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Dianil Brown R.....	Mz .....	CD
Dianil Brown X.....	Mz .....	CD
Dianil Claret B, G.....	Mz .....	CD
Dianil Crimson B, G.....	Mz .....	CD
Dianil Dark Blue R, 3R.....	Mz .....	CD
Dianil Dark Green B.....	Mz .....	CD
Dianil Deep Black, B conc, FF conc, TV conc, BR extra conc.....	Mz .....	CD
Dianil Direct Yellow S.....	Mz .....	CD
Dianil Green G.....	Mz .....	CD
Dianil Indigo O.....	Mz .....	CD
Dianil Japonine G.....	Mz .....	CD
Dianil Orange F, G, O, BM.....	Mz .....	CD
Dianil Red 4B.....	Mz .....	CD
Dianil Scarlet G, 2R.....	Mz .....	CD
Dianil Yellow G, 3G, R, OO MB.....	Mz .....	CD
Dianisidine Blue .....	By, Mz.....	Printing
Dianol Black Brown.....	Lev .....	CD
Dianol Blue G.....	Lev .....	CD
Dianol Brilliant Red extra .....	Lev .....	CD
Dianol Brown NB, R, Y, YY.....	Lev .....	CD
Dianol Green G.....	Lev .....	CD
Dianol Olive .....	Lev .....	CD
Dianol Orange Brown.....	Lev .....	CD
Dianol Violet 2B, R.....	Lev .....	CD
Dianthine, B, G.....	Lev .....	CD
Dianthine Pink .....	BrS .....	CD
Diazethyl Black B, R.....	By .....	CD
Diazine Black .....	Brs, Kell.....	CD
Diazine Blue B, 2B, R.....	K .....	CT
Diazine Brown .....	K, SW.....	CT
Diazine Green .....	K .....	CT
Diazo Black.....	K .....	CT
Diazo Black 2B, BHN, 3B, G, R.....	By .....	CD
Diazo Blue B.....	By .....	CDv

# LIST OF DYESTUFFS, MAKERS AND METHODS. 273

Name of Dye.	Agent or Maker.	Dye Method.
Diazo Blue Black RS.....	By .....	CDv
Diazo Bordeaux.....	By .....	CDv
Diazo Brilliant Black B, R.....	By .....	CDv
Diazo Brown G.....	By .....	CDv
Diazo Brown R extra, V.....	Bv .....	CDv
Diazo Deep Blue BB, 3B.....	By .....	CDv
Diazo Fast Black.....	Bal .....	WGS
Diazo Fast Black BXH, 3B, G.....	By .....	CD
Diazo Fast Black SD.....	By .....	CDv
Diazo Indigo Blue B, M, BR, extra, 3R. By .....		CDv
Diazo Marine Blue B.....	O .....	CDv
Diazo Navy Blue 3B.....	By .....	CDv
Diazo Rubine R.....	By .....	CDv
Diazo Violet R.....	By .....	CDv
Diazogene B, BB, 3B.....	By .....	CDv
Diazurine B, G.....	Kell.	
Diazyl Black .....	Bs .....	CD
Diazyl Brown G, T.....	Bs .....	CD
Dimethyl Orange .....	Bs .....	CD
Dingley Blue B, 2R.....	Sch .....	CD
Dingley Yellow 17.....	Sch .....	CD
Dioxine .....	L .....	WCh
Diphen Blue B Base, R Base.....	A .....	CD
Diphenylamine Blue .....	Mz.	
Diphenylamine Orange.....	Klp.	
Diphenyl Black B, DBB, ERF, 3G, R, RR .....	Kell .....	CD
Diphenyl Blue B, 2B, BM, DBB, EFR, EFS, 3G, NT, RR.....	Kell .....	CD
Diphenyl Blue Black.....	Kell .....	CD
Diphenyl Brown B, BY, CB, CG, CGG, R, RR, Y, 3G.....	Kell .....	CD
Diphenyl Chrysoine RR, 3G.....	Kell .....	CD
Diphenyl Catechine G, R, B.....	Kell .....	CD
Diphenyl Citronine G.....	Kell .....	CD

# 274 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Diphenyl Dark Blue R.....	Kell .....	CD
Diphenyl Fast Black.....	Kell .....	CD
Diphenyl Fast Brown G, GN.....	Kell .....	CD
Diphenyl Fast Black .....	Kell .....	CD
Diphenyl Fast Yellow G, GG.....	Kell .....	CD
Diphenyl Grey .....	Kell .....	CD
Diphenyl Green G, GB, 3G, KCG.....	Kell .....	CD
Diphenyl Indigo Blue .....	Kell .....	CD
Diphenyl Orange GG, RR, ORW.....	Kell .....	CD
Diphenyl Phosphine G, conc.....	Kell .....	CD
Diphenyl Red 8B.....	Kell .....	CD
Diphenyl Violet R, BC.....	Kell .....	CD
Diphenyl Yellow, R, GG, 3G.....	Kell .....	CD
Direct Black B.....	SS .....	CD
Direct Black BFG.....	A .....	CD
Direct Black GBN, K, G.....	Klp .....	CD
Direct Black R.....	SS .....	CD
Direct Black X.....	Bs .....	CD
Direct Black BK.....	Klp .....	CD
Direct Black DR, X.....	Bs .....	CD
Direct Black No. 8.....	A C.....	CD
Direct Black No. 5062.....	At .....	CD, CDv
Direct Blue B.....	Mz, K, Klp, SW.....	CD
Direct Blue 2B.....	SS .....	CD
Direct Blue 3B.....	Jy .....	CD
Direct Blue 3BN.....	K .....	CD
Direct Blue 3BX.....	SS .....	CD
Direct Blue 5B.....	HS .....	CD
Direct Blue G, R.....	Mz .....	CD
Direct Blue R.....	Klp, SW.....	CD
Direct Blue 2R, 3B, 2R.....	Jy, SS.....	
Direct Blue 5093.....	S W.....	CD
Direct Blue Black 2B.....	By .....	CD
Direct Brilliant Blue B.....	S W.....	CD

# LIST OF DYESTUFFS, MAKERS AND METHODS. 275

Name of Dye.	Agent or Maker.	Dye Method.
Direct Brilliant Blue BM.....	Mz .....	CD
Direct Brilliant Orange BO.....	L .....	CD
Direct Brilliant Orange M.....	Mhy .....	CD
Direct Brown BB.....	Bs .....	CD
Direct Brown BL.....	BL .....	CD
Direct Brown BS, GS, RS.....	Kell .....	CD
Direct Brown GG.....	By .....	CD
Direct Brown GX.....	Bs .....	CD
Direct Brown J.....	Klp .....	CD
Direct Brown M.....	S S .....	CD
Direct Brown N.....	L .....	CD
Direct Brown NX.....	Bs .....	CD
Direct Brown RD, 35.....	BL .....	CD
Direct Brown R, S.....	Kell .....	CD
Direct Brown RS.....	Kell .....	CD
Direct Brown SDP.....	SS .....	CD
Direct Brown TB.....	Mz .....	CD
Direct Brown TS, TSB.....	Klp .....	CD
Direct Brown VX.....	Bs .....	CD
Direct Brown 130, 131.....	H S .....	CD
Direct Brown 5002.....	SJW .....	CD
Direct Buffalo Brown R.....	Sch .....	CD
Direct Catechu Brown.....	NI .....	CD
Direct Cross Dye Black RH, RS, NM..	H .....	Sulphur
Direct Cross Dye Blue B, R.....	H .....	Sulphur
Direct Dark Green .....	Mz .....	CD
Direct Deep Black E, R, RW, T, E extra, RW extra.....	By .....	CD
Direct Deep Red P.....	At .....	CD
Direct Fast Brown B, GG.....	By .....	CD
Direct Garnet A.....	BL .....	CD
Direct Golden Yellow.....	BL .....	CD
Direct Gray .....	Jy.. .....	CD
Direct Gray B.....	Klp, SS .....	CD

# 276 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Direct Gray J.....	SS .....	CD
Direct Gray N.....	A C.....	CD
Direct Gray R.....	SS, Klp.....	CD
Direct Gray reddish .....	Klp .....	CD
Direct Gray 4R.....	SS .....	CD
Direct Green, CP.....	Klp .....	CD
Direct Green B, No. 276.....	A C, SS.....	CD
Direct Green BC.....	SW .....	CD
Direct Green BX, S.....	B L.....	CD
Direct Green C, CB.....	Mz, Kell.....	CD
Direct Green CY.....	Kell .....	CD
Direct Green G.....	Jy .....	CD
Direct Green P, A.....	Klp .....	CD
Direct Green Y.....	Klp .....	CD
Direct Green YYC.....	Sch .....	CD
Direct Green 177, 228.....	H S.....	CD
Direct Indigo Blue A, BN.....	Klp .....	CD
Direct Indigo Blue RB.....	At .....	CD & CDv
Direct Indigo Blue BK.....	Klp .....	CD
Direct Lemon Yellow .....	Klp .....	CD
Direct Navy Blue C, SB.....	Sch .....	CD
Direct New Blue 4B.....	A .....	CD
Direct Olive Y.....	Sch .....	CD
Direct Orange .....	Fl.	
Direct Orange G.....	H S.....	CD
Direct Orange KR, KY.....	Kell .....	CD
Direct Orange OR, R .....	Kell .....	CD
Direct Orange R.....	SS .....	CD
Direct Orange 2R.....	K .....	CD
Direct Orange Y.....	SS .....	CD
Direct Orange 12, 69.....	HS .....	CD
Direct Oriol Yellow .....	Kell .....	CD
Direct Pink .....	Sch .....	CD
Direct Pink B.....	Jy .....	CD

# LIST OF DYESTUFFS, MAKERS AND METHODS. 277

Name of Dye.	Agent or Maker.	Dye Method.
Direct Pink G.....	S	CD
Direct Plum .....	Jy	CD
Direct Red .....	A, By, Fl, Kell.	CD
Direct Red B.....	Bs	CD
Direct Red C, B.....	A C	CD
Direct Red E, T.....	Kell	CD
Direct Red 5SE.....	Kell	CD
Direct Red No. 55.....	HS	CD
Direct Red extra .....	Jy	CD
Direct Safranine B.....	By	CD
Direct Salmon.....	At	CD
Direct Scarlet B, conc.....	K	CD
Direct Scarlet G.....	K	CD
Direct Scarlet R.....	K	CD
Direct Sulpho Black RH, RS.....	H	Sulphur
Direct Tan 5506.....	H S	CD
Direct Union Black.....	Jy.	
Direct Violet A, C.....	Sch	CD
Direct Violet R.....	Jy	CD
Direct Violet 6 R extra .....	SS	CD
Direct Yellow .....	A, Bi, Fi, K, SS	CD
Direct Yellow C.....	K SS	CD
Direct Yellow C, P.....	Klp	CD
Direct Yellow BSR, BLR.....	At	CD
Direct Yellow G.....	A C, K, SS	CD
Direct Yellow 2G, 3G.....	K	CD
Direct Yellow NW.....	B L	CD
Direct Yellow R.....	AC, By	CD
Direct Yellow R extra.....	By	CD
Direct Yellow S.....	Sch	CD
Direct Yellow T.....	Klp	CD
Direct Yellow 443.....	FGB	CD
Direct Yellow 9673.....	Jy	CD
Discharge Black AF.....	Mz	WGS, SS
Domingo Alizarin Black.....	L	WGSch

## 278      YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Domingo Black LK.....	L .....	WGS
Domingo Blue Black R, B.....	L .....	WGS
Domingo Blue P, N, BB.....	L .....	WGS
Domingo Chrome Black MFF.....	L.....	Special
Domingo Chrome Brown.....	L .....	WCh
Domingo Chrome Red G.....	L .....	Special
Domingo Chrome Yellow G.....	L .....	Special
Domingo Green 3G, H.....	L .....	WCh
Domingo Seal Brown.....	L .....	WCh
Dominion Yellow O.....	At .....	CD
Double Brilliant Scarlet G, 2B, BR....	A .....	WGS
Double Brilliant Scarlet 3 R.....	By .....	WGS
Double Green S, F.....	K.....	
Double Ponceau 2R, 3R, 4R.....	By .....	WGS
Double Scarlet .....	K .....	WGS
Double Scarlet extra S.....	A .....	WGS
Double Scarlet G.....	tM .....	WGS
Double Scarlet R.....	Lev .....	WGS
Double Scarlet 2R.....	tM .....	WGS
Durophenine Brown V.....	Cl Co.....	CD
Eboli Blue.....	LBs.....	WG, CD
Eboli Blue B.....	L .....	CD
Eboli Green B, G.....	L, Klp.....	CD
Eboli Sky Blue.....	L .....	CD
Ebony Black .....	Klp .....	CD
Ecarlate B .....	SS .....	CD
Ecarlate J, JJ, V.....	RF .....	WGS
Ecarlate Brilliante .....	R F.....	CD
Ecarlate Croceine 3B.....	Mo.....	
Echurine .....	L M.....	
Eclipse Black B, H.....	Kell .....	Sulphur
Eclipse Blue B, R.....	Kell .....	Sulphur
Eclipse Bronze.....	Kell .....	Sulphur
Eclipse Brown 5G.....	Kell .....	Sulphur
Eclipse Corinth G.....	Kell .....	Sulphur



# LIST OF DYESTUFFS, MAKERS AND METHODS. 279

Name of Dye.	Agent or Maker.	Dye Method.
Eclipse Dark Brown.....	Kell	Sulphur
Eclipse Green GP.....	Kell	Sulphur
Eclipse Olive.....	Kell	Sulphur
Eclipse Phosphine GG.....	Kell	Sulphur
Eclipse Yellow G, 3G.....	Kell	Sulphur
Elgene Base B.....	A	CD
Elgene Blue.....	A	CT
Emerald Green Crystals.....	PK, Bt, By.	WG, SA, CT
Emin Red .....	A	WGS
Empire Black B, G.....	At	WACH
Empire Orange G.....	Bch.	
English Yellow .....		WGS
Eosamine B.....	A	WGS
Eosine A.....	P. K.	WA, SA
Eosine A conc, 2A, AG, A6G..	Mz	WA, SA
Eosine bluish.....	Kell	WA, SA
Eosine B.....	Klp	WA, SA
Eosine BB.....	Klp	WA, SA
Eosine 3B.....	Mz	WA, SA
Eosine 10B, BF.....	Math	WA, SA
Eosine BN.....	Math, P K.	WA, SA.
Eosine DH, DHV.....	Klp	WA, SA
Eosine extra, extra yellow, extra conc. extra BB, AG, A3G, A5G, D.....	Mz	WA, SA
Eosine Bluish, extra yellow, yellow- ish .....	Kell	WA, SA
Eosine G.....	Math	WA, SA
Eosine GGB, GGF, GGG.....	Math	WA, SA
Eosine J.....	P K.	WA, SA
Eosine 3J, 4J, extra.....	Mz	WA, SA
Eosine JFF.....	Math	WA, SA
Eosine S.....	P K.	WA, SA
Eosine Y.....	Sch.	WA, SA
Eosine 2110, 5765.....	Math	WA, SA

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Name of Dye.	Agent or Maker.	Dye Method.
Eosine Scarlet B.....	Mz, Math ...	WA. SA
Eosine Scarlet BB extra.....	Mz, Kell.....	WA, SA
Eosine Yellowish.....	A, BrS, K....	WA. SA
Erie Blacks .....	Sch .....	CD
Erie Green 235, DB.....	Sch .....	CD
Erie Blue BX.....	Sch .....	CD
Erika B, BN, B ex.....	A .....	CD
Erika G, G ex.....	A .....	CD
Erika 3GN, 2GN.....	A .....	CD
Erio Blue BB, G, R, RR.....	Kell .....	WGS
Erio Carmine R.....	Kell .....	WGS
Eriocyanine .....	Kell .....	WGS, SS
Erioglaucine .....	Kell .....	WGS, SS
Erio Rubine G, 2R.....	Kell .....	WGS
Erytherine X .....	P K.....	SS
Erythrine C .....	Math.	
Erythrosine .....	Br S, Klp, PK....	WA
Erythrosine .....	Mz, PK .....	WA
Erythrosine, Bluish, yellowish.....	Kell .....	WA
Erythrosine AG.....	Mz .....	WA
Erythrosine B, BB.....	A .....	WA
Erythrosine blue shade .....	Mz .....	WA
Erythrosine BNT, D, DS.....	Math .....	WA
Erythrosine extra .....	Mz .....	WA
Erythrosine G.....	P K.....	WA
Erythrosine yellow shade .....	Mz, Math.....	WA
Erythrosine 694 .....	Sch .....	WA
Ethyl Blue BF.....	Mz .....	CT
Ethyl Blue BD, RD.....	Mz .....	Printing
Ethylene Blue, B, G, R, RR.....	O.	
Ethyl Green .....	A, Bt.....	WGS, SS
Ethyl Purple 6B.....	P K.....	WGS
Excelsior Lake Scarlet JN, 2JCN.....	Math .....	WGS
Excelsior Black .....	Math .....	WGS
Excelsior Black B, G, 5G.....	Sch .....	WGS

# LIST OF DYESTUFFS, MAKERS AND METHODS. 281

Name of Dye.	Agent or Maker.	Dye Method.
Fast Acid Blue B.....	By .....	WGS
Fast Acid Blue R, R conc.....	Mz .....	WGS, SS
Fast Acid Eosine G, G extra.....	Mz .....	WGS
Fast Acid Fuchsin B.....	By .....	WGS
Fast Acid Green B, BN, BS, BZ.....	Math .....	WGS
Fast Acid Magenta G, G conc.....	Kell .....	WGS
Fast Acid Phloxine A, A extra .....	Mz .....	WGS
Fast Acid Ponceau .....	Klp .....	WGS
Fast Acid Red A.....	Mz .....	WGS
Fast Acid Red B.....	Mz, PK.....	WGS
Fast Acid Scarlet .....	Klp .....	WGS
Fast Acid Violet A2R.....	Mz .....	WGS, SS
Fast Acid Violet B, BE.....	Mz .....	WGS, SS
Fast Acid Violet 10B.....	By .....	WGS
Fast Acid Violet R, RBE, RGE.....	Mz .....	WGS, WCh
Fast Azo Grenat .....	Mz .....	WGS
Fast Black D.....	Sch .....	CD
Fast Blue.....	Mz, Brs.....	WGS
Fast Blue B for wool.....	Mz, A, PK.....	WGS
Fast Blue for Cotton, B, 3B, 3R.....	Kell .....	CT
Fast Blue for Cotton, B, 2B, 3B, 4B 5B, 6B.....	Mz .....	CT
Fast Blue for cotton B, B2, BR2.....	A .....	CT
Fast Blue for Cotton R, 2R, 3R, RB.....	Mz .....	CT
Fast Blue 2B for Cotton.....	A, NI, SS.....	CT
Fast Blue 5B greenish.....	Mz .....	WGS
Fast Blue B, BA, 3B, 6B, for wool.....	A .....	WGS
Fast Blue 6B for wool.....	A .....	WGS
Fast Blue BN.....	Math .....	WGS
Fast Blue BBH.....	L .....	CT
Fast Blue Black paste.....	Mz .....	CT
Fast Blue Black M paste.....	Mz .....	CT
Fast Blue C.....	Jy.....	
Fast Blue D.....	Mz .....	WGS
Fast Blue EL.....	O.....	

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Name of Dye.	Agent or Maker.	Dye Method.
Fast Blue E, E000.....	O .....	WGS
Fast Blue extra greenish.....	Mz .....	WGS
Fast Blue FS .....	Mz .....	WGS
Fast Blue G.....	Bd, Bt .....	WGS
Fast Blue G extra.....	Mz .....	WGS
Fast Blue greenish.....	Mz, PK .....	WGS
Fast Blue 6G.....	Math .....	WGS
Fast Blue N.....	Sch .....	WGS
Fast Blue NG, NR.....	O .....	WGS
Fast Blue O, OO.....	Mz, Klp.....	WGS
Fast Blue OOO.....	O .....	WGS
Fast Blue BRG for cotton.....	A .....	CT
Fast Blue 3R for cotton crystals.....	Mz .....	CT
Fast Blue R.....	Mz, A. Math, PK..	WGS
Fast Blue R, RA for wool.....	A .....	WGS
Fast Blue 2R, 3R, 5R, No. 60.....	Mz .....	WGS
Fast Blue, RD, RRD.....	Math .....	WGS
Fast Blue III R.....	S.....	CT
Fast Bordeaux O.....	Mz .....	WCh
Fast Brown.....	Mz .....	WGS
Fast Brown 3B, G.....	A .....	WGS
Fast Brown N.....	P K .....	WGS
Fast Brown ONT yellowish.....	Mz .....	WGS, SS
Fast Brown R.....	Mz, PK.....	CD
Fast Brown 25.....	A .....	WGS
Fast Claret .....	HS, Klp .....	WGS
Fast Claret Red O.....	Mz .....	WGS, SS
Fast Cotton Blue B, 3B, R, RR, 3R..	Mz .....	CT
Fast Cotton Brown R.....	Kell .....	CD
Fast Cotton Orange 6R extra.....	Bs .....	CD
Fast Cotton Yellow 10G.....	Mz .....	WG, SA, CT
Fast Diamine Yellow ARR.....	Bs .....	CD
Fast Direct Blue .....	Mhy .....	CD
Fast Direct Blue G.....	Bt .....	CD
Fast Direct Brown BB, G.....	Bs .....	CD

# LIST OF DYESTUFFS, MAKERS AND METHODS. 283

Name of Dye.	Agent or Maker.	Dye Method.
Fast Fulling Blue RR.....	Bs .....	CD
Fast Gray B, R.....	Klp .....	WCh
Fast Green .....	O .....	CT
Fast Green No. 12, paste.....	Mz .....	WCh
Fast Green No. 16.....	Mz .....	WCh
Fast Green Crystals O.....	Mz .....	WCh
Fast Green extra, extra bluish.....	By .....	WGS
Fast Green B, CR.....	By .....	WGS
Fast Green B.....	Math .....	WGS
Fast Green CR.....	Bs .....	WACH
Fast Green M, SS.....	By .....	WGS
Fast Indigo Blue R.....	Klp .....	Printing
Fast Light Green .....	K .....	WGS
Fast Light Yellow, G, 3G .....	By .....	WGS
Fast Mordant Yellow G.....	By .....	WGS
Fast Navy Blue A, G.....	P K .....	CT
Fast Navy Blue GM.....	O .....	CT
Fast Navy Blue M.....	K .....	WGS
Fast Navy Blue RA.....	K .....	CT
Fast Navy Blue RM.....	O .....	CT
Fast Navy Blue RN.....	K .....	CT
Fast Neutral Violet B.....	O .....	CT
Fast New Blue for Cotton .....	Math .....	CT
Fast Orange O.....	Mz .....	Lakes
Fast Pink B.....	At .....	WGS
Fast Pink for Silk.....	Klp .....	CD
Fast Ponceau B, 2B.....	Klp.	
Fast Red.....	Mz, CDC, A, Klp..	WGS
Fast Red A.....	A, By, K, O, PK..	WGS
Fast Red B.....	NI, PK .....	WGS
Fast Red BT.....	By, Klp .....	WGS
Fast Red C.....	P K.....	WGS
Fast Red D.....	O, PK .....	WGS
Fast Red E.....	By, PK .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Fast Red E, B.....	PK, Bs	WGS, SS
Fast Red extra.....	Kell	WGS, SS
Fast Red 7B.....	NI.	
Fast Red NS.....	By	WGS, SS
Fast Red O.....	Mz	WGS
Fast Red R.....	AC	WGS
Fast Red RC.....	Sch	WGS
Fast Red RR, RY.....	PK	WGS
Fast Red S.....	Mz	WGS, SS
Fast Scarlet, B.....	K	WGS
Fast Silk Gray O.....	Mz	SS
Fast Sulphon Violet 4R, 5BS.....	S	WGS
Fast Violet .....	Klp	WCh
Fast Violet B.....	Mz	WCh
Fast Violet bluish, reddish.....	By	WGS
Fast Wool Blue A.....	A	WGS
Fast Yellow .....	BrS, By, Math, Pk.	WGS
Fast Yellow G.....	Th	CD
Fast Yellow greenish.....	Bs	WGS
Fast Yellow M.....	B L	WGS
Fast Yellow R.....	K	WGS
Fast Yellow S.....	Mz, Math	WGS
Fast Yellow 4S.....	SS	WGS
Fast Yellow TS.....	Mz	CD
Fast Yellow, 1, 2.....	Sch	CD
Fast Yellow 272.....	Sch	WGS
Fat Ponceau .....	Mz.	
Filling Blue .....	Klp	WCh
Fine New Green Crystals.....	Bt.	
Fine Violet .....	Bt.	
Firn Blue .....	Klp	WGS, SS, CT
Flavanthrene G, R.....	B	Printing
Flavazine S, L, T.....	Mz	WGS
Flavazol .....	A	WGS

# LIST OF DYESTUFFS, MAKERS AND METHODS. 285

Name of Dye.	Agent or Maker.	Dye Method.
Flavinduline .....	P K .....	CT
Florida Red, B, G.....	L .....	WGS
Fluoresceine .....	Mz, Klp, Math, PK....	
Fluoresceine G, R, 6836.....	Math .....	WGS, SS
Fluorescent Blue .....	Klp, SS.	
Formyl Blue B.....	Math .....	WGS
Formyl Violet 4B, 6B, 8B, 10B, S4B, S5B .....	Math .....	WGS
Fram Blue G .....	By .....	WGS
Fuchsine .....	Mz, P, By, Klp, Math, O, PK, NI, PS.....	WG, SS, CT
Fuchsine A .....	SS .....	WG, SS
Fuchsine BOO, JOO.....	SW .....	WG, CT
Fuchsine Crystals 685.....	Sch .....	WG, CT
Fuchsine FCOOB.....	Math.....	WG, SS
Fuchsine S.....	Mz .....	WGS, SS, CT
Full Blue O.....	Klp .....	WCh
Fulling Black .....	K .....	WCh
Fulling Blue .....	Kell .....	WGS
Fulling Blue G, R.....	Mz, Bs.....	WGS
Fulling Blue JB.....	Mz .....	CDv
Fulling Brown JB, JR.....	Mz .....	CDv
Fulling Green.....	At .....	—
Fulling Green JB, JG.....	Mz .....	CDv
Fulling Green .....	Mz, At .....	WGS
Fulling Red B.....	Math .....	WGS
Fulling Red B, FGG, FR, G.....	Bs.	
Fulling Red JB.....	Mz .....	CDv
Fulling Red R.....	Bs .....	WCh
Fulling Yellow .....	Mz .....	WGS
Fulling Yellow JG, JR.....	Mz .....	CDv
Fulling Yellow O.....	Math .....	WGS
Fulling Yellow OO.....	By, Kell .....	WCh
Gallamine Blue.....	Kell .....	WCh

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Name of Dye.	Agent or Maker.	Dye Method.
Gallanil Green.....	Klp .....	WCh
Gallanil Indigo P, PS.....	Klp .....	WCh
Gallazin A.....	DH .....	WCh
Gallein A paste, R paste, W powder...	Mz, By, PK .....	WCh
Gallein paste.....	Mz .....	WCh
Gallocyanine BS, DH.....	Mz, By, PK .....	WCh
Gallocyanine paste.....	H.....	
Gallocyanine paste D.....	A, K .....	WCh
Gambine .....	H .....	WCh
Gambine B, G, R, Y, YDS, Yellow.....	H .....	WCh
Garnet .....	HS .....	WGS
Garnet 71031.....	A C .....	WCh
Geneva Blue, C, RR.....	A C .....	WCh
Geneva Brown.....	A.....	
Gentian Blue 6R.....	Kell .....	CT
Gentianin .....	Math .....	WGS, CT
Geranium GN.....	By.....	
Geranine BB, G.....	Mz, By .....	CD
Germania Red.....	Klp .....	CT
Glacier Blue.....	Klp .....	WGS, SS, CT
Glaucol G.....	L .....	WGS
Gloria Black B.....	Math.....	WSA
Glycerine Blue, Corinth, Red.....	Kl .....	CD
Golden Brown .....	B L .....	CD
Golden Yellow.....	H .....	WGS
Gold Orange.....	Bs, By .....	WGS, CT
Gold Orange for Cotton.....	Klp.....	
Gold S, C.....	Sch .....	CD
Gold Yellow.....	By .....	WGS, SS
Gold 83.....	Gt .....	CD
Gray B, R.....	Klp.....	
Green resinate A.....	Math.....	
Grenadine .....	Mz, NI....	WG, SA, CT
Grenadine B, BB, G.....	O.....	
Grenat S.....	P K.....	



# LIST OF DYESTUFFS, MAKERS AND METHODS. 287

Name of Dye.	Agent or Maker.	Dye Method.
Guernsey Blue.....	Mz, O.	
Guinea Bordeaux B.....	A	WGS
Guinea Carmine B.....	A	WGS
Guinea Green B, G, B extra.....	A	WGS
Guinea Red 4R.....	A	WGS
Guinea Violet 4B.....	A	WGS
Half Wool Black B, T.....	O	CWD
Half Wool Black BN, 2BN, 4BN.....	B	CWD
Half Wool Black LS.....	By	CWD
Half Wool Black S.....	Math	CWD
Half Wool Blue B.....	Mz	CWD
Half Wool Blue G.....	Math	CWD
Half Wool Black S.....	Math	CWD
Havanna RF VB.....	Math	CT
Havanna Black TED.....	A C	CD
Havanna Blue DR, W.....	A C	CD
Havanna Brown CBB, O, No. 50, No. 61, B, YY.....	A C	CD
Helianthine .....	Kell, PK.	WGS, SS
Heligoland Blue B, G, GA, GG, R, 2R.....	Jy	CD
Heligoland Brown.....	NI	CD
Heligoland Red.....	NI	CD
Heligoland Yellow.....	NI	CD
Heliotrope .....	Mz, A, By	CD
Heliotrope Tannin.....	Math	CT
Heliotrope B.....	Mz, A, By, K.	CD
Heliotrope 2B.....	Mz, A, By, K.	CD
Helvetia Blue .....	Kell	WGS, CT
Hessian Acid Red L.....	L	CD
Helvetia Green.....	Bs.	
Hessian Bordeaux.....	Mz	CD
Hessian Brilliant Purple.....	Mz, A, By	CD
Hessian Brown, BB, MM.....	Bs	CD
Hessian Orange.....	L	CD
Hessian Purple, B, D. N.....	Mz, A, By	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Hessian Violet.....	Mz, A, By.....	CD
Hessian Yellow.....	Mz, A, By.....	CD
Hoechst New Blue.....	Mz.....	WGS
Hofmann's Violet.....	KB.....	WG, SS, CT
Hofmann's Violet N.....	SS.....	CT
Homophosphine G.....	L.....	CT
Hydrazine Yellow O.....	O.....	WGS
Hyrdoleine Induline, Marine	R, Primul.	
NBB, NN conc.....	RE.	
Immedial Black FF extra, G extra, NV extra, NB, NG, 2 extra.....	Math.....	Sulphur
Immedial Blue.....	Math.....	Sulphur
Immedial Blue C.....	Math.....	Sulphur
Immedial Bronze S.....	Math.....	Sulphur
Immedial Brown B, 2R.....	Math.....	Sulphur
Immedial Catechu.....	Math.....	Sulphur
Immedial Dark Brown A.....	Math.....	Sulphur
Immedial Dark Green B.....	Math.....	Sulphur
Immedial Direct Blue B, OD.....	Math.....	Sulphur
Immedial Indone R, RB conc, RG conc, RR conc.....	Math.....	Sulphur
Immedial Maroon B conc.....	Math.....	Sulphur
Immedial Olive B.....	Math.....	Sulphur
Immedial Orange C.....	Math.....	Sulphur
Immedial Sky Blue.....	Math.....	Sulphur
Immedial Yellow D.....	Math.....	Sulphur
Imperial Black.....	At.....	WGS
Imperial Green Crystals.....	Bt.	
Imperial Scarlet.....	By.....	WGS
Imperial Violet Crystals.....	At.....	WGS
Indamine Blue N, NB, N extra R....	Mz.....	CT
Indamine Gray.....	NI.	
Indamine 3R, 6R, TD.....	NI.....	CT
Indanthrene, C, S, X.....	B.....	Printing
Indazine, M, MT, P.....	Math.....	CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 289

Name of Dye.	Agent or Maker.	Dye Method.
Indazurine .....	B C F.	
Indian Yellow.....	By .....	WGS, SS
Indian Yellow G, R, FF.....	Math .....	WGS
Indigen Blue BB, R.....	Klp .....	CD
Indigene D, F.....	By.	
Indigo Blue N.....	Math .....	WG
Indigo Blue BNK.....	Klp .....	CD
Indigo Blue RB.....	S S.	
Indigo Blue SGN.....	Math .....	WGS
Indigo Extract, Synthetic MLB.....	Mz .....	WGS
Indigo Powders 1006.....	H.	
Indigo Salt T.....	K .....	Printing
Indigo Substitute B, BS, pat.....	Mz .....	WGS, SS
Indigo Synthetic.....	B, M .....	Vat
Indigo Synthetic MLB, 20% paste, 100% powder.....	Mz .....	Vat
Indigotine A, B.....	Sch .....	WGS
Indigotine extra L, No. 150.....	Math .....	WGS
Indigotine extra L, and No. 1.....	Klp .....	WGS
Indigotine O, Synthetic MLB.....	Mz .....	WGS
Indigo Vat MLBI.....	Mz .....	Dyeing
Indocyanine B.....	A .....	WA
Indon Blue 2B, 2R.....	By .....	CT
Indophenol White paste.....	Klp.	
Indophor .....	P K.	
Induline .....	Mz, Bs, By, Math, PK	
Induline B.....	K.	
Induline BE.....	SS.	
Induline 6B.....	A.	
Induline B, R powder.....	Mz .....	Printing
Induline NN, JS.....	PK.	
Induline 2N, 2N greenish, S V.....	Mz .....	WGS, SS
Induline R.....	K.	
Induline Red.....	SS .....	WGS
Induline Scarlet.....	P K .....	CT

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Name of Dye.	Agent or Maker.	Dye Method.
Indumen Blue B.....	A C .....	WCh
Ingrain Black .....	H .....	CDv
Intense Blue.....	By .....	WGS
Iodine Eosine.....	Mo.	
Irisamine G.....	Math .....	CT
Iris Blue.....	P K.	
Iris Violet.....	P K.	
Iso Diphenyl Black B, BB, R.....	Kell .....	CD
Iso Rubin.....	A .....	WGS, SS, CT
Italian Green.....	ClCo .....	CD
Janus Black O, 1, 2.....	Mz .....	SA, CDv
Janus Blue B, R.....	Mz .....	SA, CDv
Janus Bordeaux B.....	Mz .....	CDv
Janus Brown B, R.....	Mz .....	SA, CDv
Janus Claret Red B.....	Mz .....	CDv
Janus Gray B, BB.....	Mz .....	SA, CDv
Janus Green B, G.....	Mz .....	SA, CDv
Janus Red B.....	Mz .....	SA, CDv
Janus Yellow G, R.....	Mz .....	SA, CDv
Jasmine .....	Kell .....	WGS, SS
Jet Black R.....	By .....	WG, WGS
Jute Black.....	Mz, Math, O.....	CT
Jute Black B, 3R.....	Grie .....	CT
Jute Black GN.....	Math .....	CT
Katigene Black Brown.....	By .....	Sulphur
Katigene Black T, SW, 2B, TG, extra, SWR extra .....	By .....	Sulphur
Katigene Blue Black B, 4B, R.....	By .....	Sulphur
Katigene Brown 2R.....	By .....	Sulphur
Katigene Chrome Blue SG, 5G, 2R....	By .....	Sulphur
Katigene Chrome Brown, 5G.....	By .....	Sulphur
Katigene Indigo B, R, ext, RL, ext....	By .....	Sulphur
Katigene Olive, G, GN.....	By .....	Sulphur
Katigene Yellow Brown R.....	By .....	Sulphur
Katigene Yellow G.....	By .....	Sulphur

# LIST OF DYESTUFFS, MAKERS AND METHODS. 291

Name of Dye.	Agent or Maker.	Dye Method.
Kermesine Orange.....	Mz .....	WGS
Keton Blue 4BN, G, R.....	Mz .....	WGS, SS
Ketone Green NN.....	Klp .....	WGS
Kiamensi Orange G, RR.....	At .....	CD
Kiton Blue.....	Klp .....	WGS
Kiton Green.....	Klp .....	WGS
Kiton Red S.....	Klp .....	WGS
Klondike Black 153.....	H S .....	CD
Klondike Black Brown.....	H S .....	CD
Klondike Blue 51, 71.....	H S .....	CD
Klondike Brown B, G, GG, No. 156....	H S .....	CD
Klondike Olive Brown.....	H S .....	CD
Klondike Orange RR.....	H S .....	CD
Klondike Red.....	H S .....	CD
Klondike Yellow GG, 3G, No. 162....	H S .....	CD
Kresotine Yellow G, R.....	A, By, O.....	CD
Kresol Red.....	P K.....	
Kryogene Black B, BA, G.....	PK .....	Sulphur
Kryogene Blue R.....	PK .....	Sulphur
Kryogene Brown B, G.....	P K .....	Sulphur
Kryogene Olive.....	PK .....	Sulphur
Kryogene Yellow R.....	PK .....	Sulphur
Lake Red C.....	Mz .....	Lakes
Lake Scarlet FR, FRR, FRRR, GG, 2R, 3R .....	Math .....	WGS
Lake Scarlet, GRII, GRCL, RL, 2RL, 2RCL, 3RCL, 3291.....	Mz .....	WGS
Lanafuchsine SB, SG, 6B.....	Math .....	WGS
Laundry Blue B, 1, 2, 3.....	Math .....	WGS, SS, CT
Lazuline Blue.....	By .....	WGS
Leather Black New.....	Math.....	
Leather Black C.....	Mz .....	Chrome
Leather Black T.....	Mz .....	Tannin
Leather Black TB, TG.....	Math .....	Tannin
Leather Brown.....	Mz, O.....	Tannin

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Name of Dye.	Agent or Maker.	Dye Method.
Leather Yellow.....	Mz, Ba, Klp	Tannin
Leather Yellow G, GG.....	Mz	Tannin
Light Blue.....	SS, tM.	
Light Green.....	K B.	
Light Green SF, bluish, yellowish.....	P K	WGS, SS
Lithol Red.....	PK	Lakes
London Blue, extra.....	Br S.	
Luzon Black.....	At	WGS
Lyons Black.....	FGB	WGS
Lyons Blue O, R, RR.....	Mz.	
Madison Blue V.....	At	C D & C Dv
Madras Blue B.....	At, FTM.	
Madras Blue G.....	SS	WGS
Madras Blue RR.....	At	WGS
Magdala Red.....	Mz, Klp.	SA
Magenta .....	H, Math, Sch.	WG, SA, CT
Magenta Extra Large Crystals, extra yellow, Large Crystals, Small Crystals, Double Refined.....	Mz	WG, SA, CT
Magenta Large Crystals B.....	Math	WG, SA, CT
Magenta I.....	Klp	WG, SA, CT
Magenta Crystals 80408.....	R H	CT
Malachite Green.....	A, K, Klp, Math	WN, SA, CT
Malachite Green B.....	Mz, P. K.	WN, SA, CT
Malachite Green BB, 4B.....	Mz	WN, SA, CT
Malachite Green crystals.....	Mz	WN, SA, CT
Malachite Green G.....	P K	WN, SA, CT
Malachite Green Ia.....	Mz	WN, SA, CT
Malachite Green Superior.....	Mz	WN, SA, CT
Malachite Green No. 12.....	Mz	WN, SA, CT
Malachite Green Powder.....	Mz,	WN, SA, CT
Malta Blue.....	SS	CT
Malta Gray, J.....	SS	CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 293

Name of Dye.	Agent or Maker.	Dye Method.
Malta Yellow AL.....	SS .....	CT
Manchester Brown, EE, PS.....	Math .....	CT
Manchester Yellow .....	Lev. RD .....	WGS
Manhattan Black BS.....	A C.	
Manila Brown, M15G.....	Sch .....	CD
Mandarine G extra, GR.....	A .....	WGS
Mandarine Orange G, extra.....	Mz .....	WGS
Marine Blue BI, 2RX, RI.....	Mz .....	WN, SA, CT
Marine Blue HH.....	L .....	WGS
Marinol Acid Blue R.....	H .....	WGS
Marion Red.....	Mz .....	Lakes
Maroon S.....	Mz, PK.....	WGS, SS
Mars Red G.....	PK .....	
Martial Black B.....	SS.	
Martius Yellow.....	Mz.	
Mazarine Blue B, BG, RNS.....	A C .....	WCh
Mazarine Brown WO.....	A C .....	WCh
Mekon Yellow G, R.....	Klp .....	CD
Melanogen G, T.....	Mz .....	Sulphur
Melanogen Black G, T.....	Mz .....	Sulphur
Melanogen Blue B, BG.....	Mz .....	Sulphur
Melantherin JH.....	Klp .....	CD
Melita Blue 6G.....	L .....	WGS
Mendola's Blue.....		CT
Mercaptol Black .....	SS .....	Sulphur
Mercerine Wool Red 10B, G.....	H .....	WA
Mercerol Wool Yellow R.....	H .....	WA
Meridian Green B.....	At .....	CD
Meridian Violet 51.....	At .....	CD
Meridian Yellow 000.....	At .....	CD
Merino Blue, R.....	SS.	
Merino Brown.....	SS.	
Merino Yellow.....	SS.	
Metachrome Bordeaux.....	A .....	Special
Metachrome Brown B.....	A .....	Special

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Name of Dye.	Agent or Maker.	Dye Method.
Metachrome Mordant.....	A .....	Special
Metachrome Orange R double.....	A .....	Special
Metchrome Yellow RD, 2RD.....	A .....	Special
Metamine Blue B, G.....	Klp .....	CT
Metanil Red 3B, 3B extra.....	By .....	WGS
Metanil Yellow .....	Mz, A, Bs, By, K. Kell, O, Math, PK . . .	WGS
Metaphenylene Blue B, BB.....	Math .....	WGS
Metaphenyl Yellow ME.....	SS .....	WGS
Methyl Alkali Blue.....	Mz, K, Kell, Klp, O, PK.	
Methyl Blue.....	Math, tM .....	SS, CT
Methyl Blue for Cotton.....	Mz, O....	WGS, SS, CA
Methyl Blue for Silk.....	Mz, O.....	SS
Methyl Blue New.....	Kell.	
Methyl Blue GS.....	Math.	
Methyl Cotton Blue.....	Kell .....	CA
Methyl Diphenylamine Blue.....	Mz.	
Methylene Blue B.....	Mz, Kell, O, PK.....	
	WN, SA, CT	
Methylene Blue B cono.....	Mz .....	WN, SS, CT
Methylene Blue BB.....	Mz, Sch, A. WN, SS, CT	
Methylene Blue BB conc.....	Mz, PK....	WN, SS, CT
Methylene Blue BB crystals.....	CR .....	WN, SS, CT
Methylene Blue BB, extra.....	Mz .....	WN, SS, CT
Methylene Blue powder extra.....	A, PK....	WN, SS, CT
Methylene Blue B, G, B, H.....	PK .....	WN, SS, CT
Methylene Blue crystal, chem. pure....	Mz .....	WN, SS, CT
Methylene Blue D, DB, DBB extra, DBB conc, DR, etra D.....	Mz .....	WN, SS, CT
Methylene Blue D, pure.....	O .....	WN, SS, CT
Methylene Blue G.....	Math .....	WN, SS, CT
Methylene Blue 4BEE.....	SS .....	CT
Methylene Blue 4BEESL.....	SS .....	Printing



# LIST OF DYESTUFFS, MAKERS AND METHODS. 295

Name of Dye.	Agent or Maker.	Dye Method.
Methylene Blue powder D, Powder I, R, RB, R conc, RR.....		
Methylene Blue RR.....	O .....	WN, SS, CT
Methylene Blue 3R, 5R, 6R.....	Mz .....	WN, SS, CT
Methylene Blue V.....	Kell .....	WN, SS, CT
Methylene Blue, Zinc free.....	Mz .....	WN, SS, CT
Methylene Dark Blue 3BN, RBN, pat..	Mz .....	WN, SS, CT
Methylene Gray B, BF, G, ND, NF, O, R .....	Mz .....	WN, SS, CT
Methylene Green.....	Kell .....	WN, SS, CT
Methylene Green G, GG, O, extra yel- low, yellow conc.....	Mz .....	WN, SS, CT
Methylene Heliotrope O.....	Mz .....	WN, SS, CT
Methylene Indigo O.....	Mz .....	WN, SS, CT
Methylene Violet.....	SS .....	WN, SS, CT
Methylene Violet EN, RRA, RRRA4..	Mz .....	WN, SS, CT
Methyl Rosine.....	A, Klp....	WN, SS, CT
Methyl Green.....	A, By, K, Math,	SS.
Methylindone B, R.....	Math.	
Methyl Violet B, 2B.....	Mz, A, By, Math, NI, O, PK.	
Methyl Violet 2B, c. p.....	Mz .....	WG, SA, CT
Methyl Violet 2BC.....	Sch .....	WG, SA, CT
Methyl Violet BO.....	Math .....	WG, SA, CT
Methyl Violet 3B.....	Mz, Math, O.	
Methyl Violet 3BD.....	Math .....	WG, SA, CT
Methyl Violet 3BO.....	Bch.	
Methyl Violet 4B.....	Mz, Math, O.....	
		WG, SA, CT
Methyl Violet 4BO.....	Math .....	WG, SA, CT
Methyl Violet 5B.....	Mz, Math, O.....	
		WG, SA, CT
Methyl Violet 6B.....	Mz, Math, O.....	
	....	WG, SA, CT

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Name of Dye.	Agent or Maker.	Dye Method.
Methyl Violet 6BO.....	Mz, K, Math, NI, O, SS .....	WG, SA, CT
Methyl Violet 6B, chem. pure.....	Mz .....	WG, SA, CT
Methyl Violet 6B, crystals.....	Kell, Klp, PK .....	WG, SA, CT
Methyl Violet BSC.....	Math .....	WG, SA, CT
Methyl Violet extra.....	Mz .....	WG, SA, CT
Methyl Violet OB, OBB, O3B, O4B, O5B, O6B, O3R.....	O .....	WG, SA, CT
Methyl Violet R, 2R.....	Mz, Math.....	SW, WG, SA, CT
Methyl Violet 3R, 4R.....	Mz, Math.....	WG, SA, CT
Methyl Violet 5R.....	Mz .....	WG, SA, CT
Methyl Violet RO.....	Math .....	WG, SA, CT
Methyl Violet RSJ.....	Math .....	WG, SA, CT
Methyl Violet superior.....	Mz .....	WG, SA, CT
Methyl Violet 72 O.....	Math .....	WG, SA, CT
Methyl Water Blue.....	P K .....	WG, SA, CT
Metol Blue .....	LBF .....	CD
Mikado Brown B, 3GA, MG.....	Mz, Bs .....	CD
Mikado Gold Yellow, 2G, 4G, 6G, 8G.....	Mz, Bs .....	CD
Mikado Orange G, R, 2R, 3R, 4R, 5R.....	Mz, Bs .....	CD
Mikado Yellow, 2G, 4G, 6G.....	Mz, Bs .....	CD
Milling Blue 85.....	H S .....	WGS
Milling Green B.....	NYB .....	WGS
Milling Red E.....	SS .....	WGS
Milling Red FFG, FR, G, R.....	Math .....	WGS
Milling Red 82.....	H S .....	WGS
Milling Yellow II, O, OO.....	Math .....	WGS
Milling Yellow 55.....	SS .....	WGS
Milling Yellow 84.....	HS .....	WGS
Mimosa, YC.....	Kell .....	CD
Moline .....	At .....	WCh
Montana Brown 3G, M.....	L .....	CD
Mordant Yellow G, 3R.....	PK .....	WCh

# LIST OF DYESTUFFS, MAKERS AND METHODS. 297

Name of Dye.	Agent or Maker.	Dye Method.
Mordant Yellow O, R.....	Mz .....	WCh
Muscarine .....	Klp .....	CT
Naccarat .....	SS .....	WGS
Nako Black O.....	Mz .....	Fur
Nako Brown D, P.....	Mz .....	Fur
Nako Red O.....	Mz .....	Fur
Nako Yellow O.....	Mz .....	Fur
Naphthalene Acid Black S.....	By .....	WGS
Naphthalene Black 2B, D.....	H .....	WGS
Naphthalene Blue B, 5G.....	Mz .....	WGS
Naphthalene Green conc, V.....	Mz .....	WGS
Naphthaline Pink or Scarlet, see Mag- dala Red.....		
Naphthaline Yellow.....	Mz, Bs, Math.....	WGS
Naphthamine Blue 2B, 5B, BR, 2R, 3R.K .....		CD
Naphthamine Blue BE, GE.....	K .....	CDv
Naphthamine Brown 2B, 6B, R, N, 8B, RB .....	K .....	CD
Naphthamine Indigo Blue G, 2B, 5B, 2R .....	K .....	CD
Naphthazarine Black.....	B .....	WCh
Naphthazarine Blue.....	Bs .....	WGS
Naphthazarine Blue B.....	O .....	WGS
Naphthazarine Blue O.....	Bs .....	WGS
Naphthazarine R, S, B, BE, RE.....	O.....	
Naphthine Brown.....	SS .....	WCh
Naphthion Red, see Orseille Substi- tute V.....		
Naphthine S.....	SS.	
Naphthoacetine Fast Black.....	Sch .....	WCh
Naphthocyanine .....	E P.	
Naphthogen Blue 2R, 4R.....	A .....	CDv
Naphthol S.....	Math.	
Naphtho Ruby.....	By .....	WGS
Naphthol Black B.....	Math .....	Printing

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Name of Dye.	Agent or Maker.	Dye Method.
Naphthol Black BB, 3B, 4B, 6B, 12B.	Math	WGS
Naphthol Black 4BA.	H	WGS
Naphthol Black D.	Mz	WGS
Naphthol Black P, NY, SG, 4R.	Math	WGS
Naphthol Blue B, D.	R E	WGS
Naphthol Blue 2B.	P K	WGS
Naphthol Blue G, R.	Math	WGS
Naphthol Blue Black A.	Math	WGS
Naphthol Brown 193.	H S	WGS
Naphthol Green B, OO.	Math	WGS
Naphthol Orange	A	WGS
Naphthol Red	S B	WGS
Naphthol Red C.	Math	WGS
Naphthol Red O.	Mz	WGS
Naphthol Red S.	P K	WGS
Naphthol Yellow	Klp	WGS
Naphthol Yellow S.	Mz, By, Klp, Math, O, PK	WGS
Naphthol Yellow SE.	Mz	WGS, SS
Naphtalene Yellow.	Math.	
Naphtylamine Black 6BD.	Math	WGS
Naphtylamine Brown.	P K	WGS
Naphtylamine Pink.	Klp	WGS
Naphtylamine Yellow.	K	WGS
Naphtyl Blue.	K	WGS
Naphtyl Blue 2B.	P K	CD
Naphtyl Blue Black MNY, N, R, SB, S2B, S3B, FBB, FB.	Math	WGS
Naphtyl Violet.	K.	
Naphtylene Blue R, crystals.	By.	
Naphtylene Red.	By	CD
Narceine	Klp.	
Navy Blue B.	A C, Klp	WGS
Navy Blue BW, H.	Klp	WGS
Navy Blue Double conc., DR.	O	CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 299

Name of Dye.	Agent or Maker.	Dye Method.
Navy Blue B, R.....	Mz .....	Printing
Navy Blue V.....	Mz .....	WGS, SS, CT
Neptune Green S, SG.....	P K.	
Neptune Green 60.....	H S .....	WGS
Nerol Black B, BB, 2G new, 4B, 2BG, 4BG .....	A .....	WA
Nerol Blue Black.....	A .....	WA
Nerogene D.....	A .....	Developer
Neutral Blue.....	Math .....	CT
Neutral Blue R, 3R.....	Mz .....	WN, WGS
Neutral Fast Violet B.....	Math.	
Neutral Gray G.....	A.	
Neutral Red extra.....	Math.	
Neutral Scarlet.....	Mz .....	CT
Neutral Violet extra.....	Math.	
Neutral Violet Fast B powder.....	Math.	
Neutral Violet O.....	Mz .....	WN
New Acid Green GX, 3BX.....	By .....	WGS
New Acridine Orange G.....	Bs .....	CT
New Blue B, BF, D, 110, extra F, G, FL, L, O1114A, R, crystal, R pow- der, 72325.....	Math .....	CT
New Blue O.....	Mz .....	SS, WGS
New Blue R.....	Bs, By, Math.	
New Coccine.....	A, Klp.	
New Coccine O.....	Mz .....	WGS, SS
New Coccine R.....	A .....	WGS
New Cotton Solid Blue.....	Klp .....	CT
New Croceine.....	P K .....	WGS
New Direct Blue B.....	A .....	CD
New Ethyl Blue, B, R, BS, RS.....	Mz .....	OT
New Fast Belgium Blue F.....	A C .....	WCH
New Fast Black.....	B L.	
New Fast Blue paste, F, H.....	By.	
New Fast Blue 3R, crystals.....	Mz .....	CT

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Name of Dye.	Agent or Maker.	Dye Method.
New Fast Gray.....	By .....	CT
New Fast Green 3B.....	Klp .....	CT
New Fuchsine.....	Klp .....	WGS, SS, CT
New Gray.....	By .....	WGS, CT
New Green.....	By .....	WGS, SS, CT
New Green O paste, powder.....	Mz .....	Printing
New Indigo.....	Klp .....	CD
New Magenta.....	O .....	WN, WG, SA, CT
New Magenta O.....	Mz .....	WN, WG, SA, CT
New Metamine Blue M.....	Mz .....	CT
New Methylene Blue BB, F, GG, N, NX, NF, R, 3R, 70721.....	Math .....	CT
New Methylene Blue F, FR.....	By .....	CT
New Methylene Gray B paste G powder.....	Mz .....	CT
New Patent Black B, E.....	K .....	WGAs
New Patent Blue B, 4B, GA.....	By .....	WGS
New Patent Silk Blue.....	By .....	SS
New Phosphine G.....	Math .....	CT
New Red L.....	K .....	WGS
New Solid Green BB, 3B.....	Klp .....	WGS, SS, CT
New Toluylene Blue B, GG, M, R.....	O .....	CD
New Toluylene Brown B, BB, BBO, P.O .....		CD
New Victoria Black B.....	By .....	
New Victoria Black Blue.....	By .....	
New Victoria Blue B.....	By .....	WGS, CT
New Victoria Blue GG.....	Klp .....	CT
New Victoria Green.....	By .....	
New Yellow.....	P K .....	WGS, CT
New Yellow L.....	K.....	
Niagara Blue 6B.....	Sch .....	CD
Niagara Direct Black.....	Sch.....	CB
Niagara Union Black.....	Sch .....	CWD
Nicholson Blue.....	Br, S, Klp.	
Nicholson Blue B, 2B, 4B, R, 2R, 3R.....	Mz.....	
Night Blue.....	Klp, PK.....	WGS

# LIST OF DYESTUFFS, MAKERS AND METHODS. 301

Name of Dye.	Agent or Maker.	Dye Method.
Nigramine .....	Nil .....	
Nigrogene Orange.....	PL .....	WGS
Nigrophor .....	B .....	Printing
Nigrisine, J.....	SS.	
Nigrosine alcohol soluble.....	Mz, A, Bs, Kell, Math, NI, SS.	
Nigrosine crystals, E, 73651.....	Math.	
Nigrosine water soluble.....	Mz, A, Bs, Klp, K, Kell, Math.	
Nigrosine water soluble No. 10, No. 12.	Mz.	
Nigrosine Gray Blue, 1, 2, 3, 4.....	Mz .....	WN. SS
Nile Blue A, 2B, NN, R.....	P K .....	CT
Nitrazine Yellow.....	O.	
Nitrazol C.....	Math.	
Nitrophenine .....	ClCo .....	CD, WCh, SA
Nitrosamine Red.....	PK .....	CDv
Nitroso Base M 50%.....	Mz .....	Printing
Nitroso Blue MRS.....	Mz .....	Printing
Non Mordant Cotton Blue.....	Br. S.	
Nopaline .....	tM.	
Nyanza Black B.....	A, Mz .....	OD
Nubian Black.....	H S.	
Oenanthinine .....	Klp .....	WGS, SS
Oil Yellow A, B, D.....	Math.	
Oil Black, Blue, Brown, Green, Orange, Red, Violet.....	Math.	
Old Gold SC.....	S W .....	CD
Old Scarlet.....	By .....	WGS
Oleine .....	B L.	
Opal Blue.....	Mz, Br, S, Math.	
Opal Blue superfine, soluble.....	Mz .....	WGS, SS, CT
Opaline Black 1602.....	Bch .....	CD
Opaline 2G, 5G, R.....	Gb.	
Oramine Blue R.....	P K .....	CD
Orange .....	tM .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Orange Crystals .....	NYB .....	WGS
Orange A.....	Mz, Klp, Math.....	WGS, SS
Orange I.....	Mz, By, K. Klp, Math	WGS, SS
Orange II.....	Mz, Klp, Math, SS...	WGS, SS
Orange III.....	Klp, Math, SS.WGS, SS	
Orange IV.....	Mz, Bs, Kell, Klp, PK, SS .....	WGS, SS
Orange ENL, ENZ, extra, 2G.....	Math .....	WGS
Orange G.....	Mz, A. Math, PK....	WGS
Orange GG.....	Bs, Math.	
Orange GG crystal.....	Math.	
Orange GRX.....	P K .....	WGS
Orange GS.....	O .....	WGS
Orange GT.....	By .....	WGS
Orange M.....	Klp .....	WGS
Orange MG paste.....	Klp .....	WGS
Orange MN.....	Klp .....	WGS
Orange N.....	K, Klp, PK.....	WGS
Orange P.....	O .....	WGS
Orange R.....	Mz, Klp, Math, PK..	WGS
Orange RL, RRL, RN.....		
Orange RR.....	Math .....	WGS
Orange TA.....	Mz .....	WGS, SS
Orange Y.....	CDC .....	WGS
Orange 4.....	Mz, Math .....	WGS
Orange 4LL.....	Mz .....	WGS, SS
Orcelline .....		
Orchil Substitute G pat.....	Mz .....	WGS
Oriol Yellow.....	Kell .....	CD
Oregon Black.....	AC .....	CD



# LIST OF DYESTUFFS, MAKERS AND METHODS. 303

Name of Dye.	Agent or Maker.	Dye Method.
Oregon Blue L, U.....	AC .....	WGS
Oregon Pink, Red, Yellow.....	AC .....	WGS
Orseille Red A.....	P K .....	WGS
Orseille Substitute G.....	A .....	WGS
Orseille Substitute N extra.....	Math .....	WGS
Orseille Substitute V.....	A, SS .....	WGS
Orseille Substitute 3VN.....	SS .....	WGS
Orseilline BB.....	By .....	WGS
Orseilline B, R.....	Mz .....	WGS, SS
Orchil Crimson powder.....	P K .....	WGS
Oxamine Blue B, Bg, G.....	F, PK.....	CD
Oxamine Blue 4B, R.....	PK .....	CD
Oxamine Blue 3R, RX, 4R.....	PK .....	CD
Oxamine Blue Black BR.....	PK .....	CD
Oxamine Maroon.....	P K .....	CD
Oxamine Red.....	P K .....	CD
Oxamine Scarlet B.....	F.....	
Oxamine Violet.....	P K .....	CD
Oxblood 8851.....	Bs .....	CD
Oxy Diamine Black A, AM, AT, B, BG, BM, BZ, BZS, CBS, D, N, NF, NR, S0000, NRT, R, RR, SA, S000, W, FFC extra, FFG, AFF, JE, JEI, JB, JW .....	Math .....	CD
Oxy Diamine Blue 3R, G, 3G, 5G.....	Math .....	CD
Oxy Diamine Orange G, R.....	Math .....	CD
Oxy Diamine Violet B, G, R.....	Math .....	CD
Oxy Diamine Yellow GG.....	Math .....	CD
Oxydianil Yellow O.....	Mz .....	CD
Oxyphenine Gold.....	ClCo.....	
Oxyphenine Gold G.....	H S .....	CD
Paeonine .....	Kell.....	
Palatine Black 4B.....	P K .....	WGS
Palatine Chrome Black.....	P K .....	WGSCh
Palatine Chrome Bordeaux.....	PK .....	WGSCh

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Name of Dye.	Agent or Maker.	Dye Method.
Palatine Chrome Brown.....	P K .....	WGSCh
Palatine Chrome Red R.....	PK .....	WGSCh
Palatine Chrome Violet.....	PK .....	WGSCh
Palatine Red.....	P K .....	WGS
Palatine Scarlet .....	P K .....	WGS
Paper Blues.....	Mz.	
Paper Orange OO.....	Mz .....	Paper
Paper Scarlet bluish.....	P K.	
Paper Scarlet Blue and Yellow, 3B, 8086 .....	Mz .....	
Para Blue.....	NI.	
Paramine Brown C, R.....	CR.	
Paramine Indigo Blue, Navy Blue.....	CR.	
Paraphenylene Blue R, Violet.....	Bs .....	CT
Paraphosphine G, R.....	Math .....	CT
Paratol Maroon .....	Mz .....	Lakes
Paratol Orange .....	Mz .....	Lakes
Paratol Rose .....	Mz .....	Lakes
Paratol Red .....	Mz .....	Lakes
Paris Violet.....	SS .....	CT
Paris Violet 6B, 7B.....	RE .....	CT
Parma R paste.....	S .....	WCh, CT
Patent Blue A, AJI, B, G conc., J1, J2, N, L, J3, J0, J00, V superfine, VG, WS, RL, 2RL.....	Mz .....	WGS
Patent Green O, V.....	Mz .....	WGS
Patent Marine Blue LE.....	Mz .....	WGS
Patent Orange.....	A .....	WGS
Patent Phosphine.....	Klp .....	CD
Patent Rock Scarlet.....	Br. S.....	CD
Pecora Black.....	Sch .....	CD
Pegu Brown G, DR.....	Bs .....	CD
Peri Wool Blue B, G.....	Math .....	WGS
Persian Yellow.....	Kell .....	WCh
Phenamine Blue B, G, R.....	P K .....	WGS

# LIST OF DYESTUFFS, MAKERS AND METHODS. 305

Name of Dye.	Agent or Maker.	Dye Method.
Phenedine Brown, Y, 2Y, 3Y.....	SS	CD
Phenedine Brown By, 2By, 3By.....	SS	CD
Phenedine Orange J.....	SS	CD
Phenedine Pink JE.....	SS	CD
Phenedine Yellow 2A.....	SS	CD
Phenocyanine, B, D.....	Klp	Printing
Phenocyanine TB, TV, VS.....	Klp	WCh
Phenol Black SS.....	By.	
Phenol Blue Black 3B.....	By	WGS
Phenol Flavine.....	O.	
Phenylamine Black 4B, T.....	By	WA
Phenyl Blue Black N.....	By	WGS
Phenylene Black.....	SS	WGS
Phenylene Brown B, R.....	O	CT
Phenylene Red B.....	SS	SA
Phenylene Violet B, R.....	SS	WGS
Philadelphia Yellow G.....	A	CT
Phloxine .....	Mz, Kell, Klp, Math.	WA
Phloxine B, BB.....	Mz	WA
Phloxine 5B, BA, BA extra, G, O, GA ex .....	Mz	WA
Phloxine P.....	P K	WA
Phloxine TA.....	Mo.	
Phloxine 749.....	Math.	
Phoenix Red A.....	Math.	
Phosphine .....	Mz, Br, S, Kell, Math, NI, PK, SS....	Tannin
Phosphine 1A, 11A, extra.....	Math	Tannin
Phosphine N.....	K	Tannin
Phosphine P, LM, extra.....	Mz	Tannin
Phosphine G R.....	S W	CT
Pigment Brown.....	PK.	
Pigment Fast Yellow GR.....	Mz	Lakes
Pigment Red B.....	Mz	Lakes

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Name of Dye.	Agent or Maker.	Dye Method.
Pigment Scarlet 3B.....	Mz .....	Lakes
Pin. B R.....	B L .....	CD
Pluto Black B, G, R, A, 3B, CR, L conc		
TG extra conc, A extra, CF extra,		
F extra .....	Bv .....	CD
Pluto Brown R.....	By .....	CD
Pluto Orange G. ....	By .....	CD
Polychromine B, A.....	Kell .....	CDv
Polyphenyl Black, B, G.....	Kell .....	WG, WGS
Polyphenyl Black GI, RI.....	Kell .....	CD
Polyphenyl Orange Rexh.....	Kell .....	CD
Ponceau B extra.....	Mz .....	WGS
Ponceau BO extra BO, BOG.....	A .....	WGS
Ponceau Brilliant 4R.....	Math .....	WGS
Ponceau G.....	Mz, Math .....	WGS
Ponceau 2G.....	Mz, PK .....	WGS, SS
Ponceau 4GB.....	A .....	WGS, SS
Ponceau GR, GR2, GRCL.....	Mz .....	WGS, SS
Ponceau J, JJ.....	Math .....	WGS, SS
Ponceau R.....	Mz, A, PK, SS.....	WGS, SS
Ponceau 2R, 3R, 2RCL, 3RCL.....	Mz .....	WGS, SS
Ponceau 2RS.....	SS .....	WGS, SS
Ponceau 3RB.....	A, P K .....	WGS, SS
Ponceau 4R.....	Mz, A, PK.....	WGS, SS
Ponceau 4RB.....	A .....	WGS, SS
Ponceau 5R.....	Mz .....	WGS, SS
Ponceau 6R, 6R crystal.....	Mz, PK .....	WGS, SS
Ponceau 6RB, 10RB, S extra, SS extra.....	A .....	WGS, SS
Ponceau YB.....	Mz .....	WGS, SS
Prague Alizarine Yellow G, R.....	Kl .....	WCh
Primrose .....	S.....	
Primrose, alcohol and water soluble.....	Klp.....	
Primula B, R.....	Mz .....	WG, SA, CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 307

Name of Dye.	Agent or Maker.	Dye Method.
Primuline .....	Mz, BrS, By, HS, K, Kell, Math, PK.	
Printing Black for Wool.....	PK .....	Printing
Printing Blue.....	A.	
Printing Blue B, H paste powder.....	R, Math.	
Prune, powder.....	Mz .....	WCh
Prune pure.....	Mz, Math.....	WCh
Pure Blue.....	Mz, Klp, Math, PK.	
Pure Blue B S J.....	Klp .....	WGS, SS
Pure Blue O conc. double conc.....	Mz .....	WGS, SS, CT
Pure Blue extra crystals.....	O .....	CT
Pure Blue V C.....	SS .....	SA
Pure Fast Yellow.....	Math.	
Pure Soluble Blue.....	Math.	
Purple Blue O.....	Mz .....	WGS, SS, CT
Purpuramine DH.....	D H.....	CD
Purpurine paste.....	BaCo, By, PK.	
Pyramine Orange, Y, 3G.....	PK .....	CD
Pyrogene Black BD.....	Klp .....	Sulphur
Pyrogene Blue 2R.....	Klp .....	Sulphur
Pyrogene Brown 5C, M, R, V.....	Klp .....	Sulphur
Pyrogene Direct Blue R, G.....	Klp .....	Sulphur
Pyrogene Gray B, G, R.....	Klp .....	Sulphur
Pyrogene Green B.....	Klp .....	Sulphur
Pyrogene Indigo.....	Klp .....	Sulphur
Pyrogene Olive N.....	Klp .....	Sulphur
Pyrogene Yellow M.....	Klp .....	Sulphur
Pyrol Black B conc. BB extra conc. G conc. X.....	L .....	Sulphur
Pyrol Blue Black.....	L .....	Sulphur
Pyrol Bronze.....	L .....	Sulphur
Pyrol Brown G.....	L .....	Sulphur
Pyronine B, G.....	Mz, Bs....	WGS, SS, CT
Pyrosine B, J.....	Mo .....	WGS
Pyrotine Orange.....	Bs .....	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Pyrotine RRO.....	Bs .....	WGS
Quinoline Yellow.....	Mz, A, By, PK....	WGS
Red B.....	Math, PK.....	SW, CD
Red Blue crystals, powder.....	O .....	CT
Red C.....	PK.	
Red for Lake P.....	Mz .....	Lakes
Red 785.....	AC .....	WGS
Red Violet RS, 4RS, 5R extra, 5RS....	PK .....	WGS, SS, CT
Red, Y, YB, YG, Y2G.....	Mz .....	WGS, SS
Regina Purple, Violet.....	BrS.	
Regina Violet, alcohol, water soluble..	A .....	WGS, SS
Resinate Blue A.....	Math.	
Resinate Green A.....	Math.	
Resinate Red A.....	Math.	
Resinate Yellow A.....	Math.	
Resinate Violet A.....	Math.	
Resorcine Brown.....	A .....	WGS
Resorcine Yellow.....	A, K.....	WGS
Resorgyl Yellow.....	R F.....	CD
Rheonine A, GD.....	PK .....	CT
Rhine Blue BH.....	Jy .....	CD
Rhodamine B, B extra, 3B, G, G extra.	Mz, Klp, PK....	WA, SA
Rhodamine 3G, 5G.....	Klp, PK. .	WA, SA, CT
Rhodamine 6G, 5G.....	Klp, PK. .	WA, SA, CT
Rhodamine 5G.....	By .....	WA, SA, CT
Rhodamine extra B, O, R.....	Klp .....	WGS, SS
Rhodamine S.....	Klp, PK....	WGS, SS
Rhodinduline Red B.....	By .....	WGS, SS
Rhodinduline Red G, S.....	By .....	WGS, SS
Rhodinduline Violet.....	By.	
Rhodinduline 2BR, Pink, RIV.....	HS .....	WGS
Rhoduline Blue R, GG extra.....	By .....	CT
Rhoduline Pure Blue BB.....	By .....	CT
Rhoduline Heliotrope.....	By .....	CT
Rhoduline Heliotrope 3B.....	By .....	CT

# LIST OF DYESTUFFS, MAKERS AND METHODS. 309

Name of Dye.	Agent or Maker.	Dye Method.
Rocelline .....	Kell, Klp, Math.	SS WGS, SS.
Rocelline N.....	Mz .....	WGS, SS
Rock Scarlet YS.....	BrS.	
Rosanthere A, B, OB, O, R.....	Klp .....	CDv
Rosazeine O extra B, B extra, 4G.....	Mz .....	WA, SA, CT
Rosazine .....	SS .....	WGS
Rosafond .....	RH .....	CD
Rosazurine, B, BB, G.....	Mz, By .....	CD
Rose Bengale.....	Kell, Math, PK, WA, SA	
Rose Bengale AT.....	A, PK.....	WA, SA
Rose Bengale, B, 3B conc., G.....	Mz .....	WA, SA
Rose Bengale N.....	Math .....	WA, SA
Roseine .....	BrS.	
Roseline B, G, R.....	Mz.	
Rosinduline 2B Bluish, G, 2GB.....	K .....	WGS
Rosolane B, O, R, T paste.....	Mz .....	SA, CT
Rosolane .....	SS .....	WGS, SA
Rosophenine .....	ClCo .....	CD, WGS, SS
Rosophenine 4B, 5B, 6B.....	ClCo .....	CD
Rosophenine R, ink.....	ClCo .....	CD
Rosophenine Geranine.....	ClCo .....	CD
Roxamine .....	BK.	
Royal Green crystals.....	Klp.	
Royal Violet R.....	Mz .....	CT
Rubidine .....	KB.	
Rubin, S.....	A .....	SA, CT
Ruby small crystals.....	KB.	
Rubramine .....	NI .....	CT
Ruffgallol .....	PK .....	WCh
Russia Red B, G.....	Mz, Math .....	CT
Russian Leather Red.....	Math, O.	
Russian Red B, BB, G, GP, N.....	O.	
Sabol Brown, or palmetto extract.....	Nat.	
Safraniline .....	Kell.....	WGS, SS, CT

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Name of Dye.	Agent or Maker.	Dye Method.
Safranine .....	Mz, Kell, Klp, Math.	
Safranine AG, AGT extra.....	K .....	SA, CT
Safranine AN extra.....	Mz, Math .....	SA, CT
Safranine B.....	SW .....	SA, CT
Safranine B best.....	Kell .....	CT
Safranine B conc.....	Mz .....	CT
Safranine BS.....	Math .....	SA, CT
Safranine conc.....	Mz .....	SA, CT
Safranine FB extra.....	PK .....	SA, CT
Safranine FF extra No. 0.....	By .....	SA, CT
Safranine G.....	O.	
Safranine G extra.....	A, Math.....	SA, CT
Safranine GGF, GGP.....	Math.....	SA, CT
Safranine GGS.....	Mz, Math.....	SA, CT
Safranine M.....	O.	
Safranine MN, NY.....	PK.....	SA, CT
Safranine NT .....	Math.....	SA, CT
Safranine O.....	Mz, Math .....	SA, CT
Safranine PK .....	Math.....	SA, CT
Safranine Purple .....	PK .....	SA, CT
Safranine RS, Resinate.....	Math.....	SA, CT
Safranine superfine, bluish, yellowish.	Kell.....	SA, CT
Safranine S 150.....	Math.....	SA, CT
Safranine T.....	Math.....	SA, CT
Safranine Y.....	BrS, Klp.	
Safrosine .....	PK.....	SA, CT
Sallcine Yellow, G, 2G.....	K .....	CD
Salmon Red.....	A, NI, PK.....	CD
Scarlet B.....	Math .....	
Scarlet B extra.....	Mz .....	WGS, SS
Scarlet Cardinal.....	PS .....	
Scarlet EC, FR, FRR, FRRR, for cotton .....	Math .....	CAL
Scarlet G, GG, GL, GR11, GV.....	Mz .....	WGS, SS
Scarlet BR.....	A .....	WGS, SS



LIST OF DYESTUFFS, MAKERS AND METHODS. 311

Name of Dye.	Agent or Maker.	Dye Method.
Scarlet GRCL.....	Mz .....	WGS
Scarlet NR, NRR.....	SS .....	WGS, SS
Scarlet R .....	Mz, By .....	WGS, SS
Scarlet RBC.....	Math .....	WGS, SS
Scarlet RL.....	Mz .....	WGS, SS
Scarlet 2R.....	Mz, Klp .....	WGS, SS
Scarlet 2RCL, 3RCL.....	Mz .....	WGS
Scarlet RRL.....	Mz, Math .....	WGS, SS
Scarlet RVL.....	Mz .....	WGS, SS
Scarlet 3R, 3RL, 4R, 5R.....	Mz .....	WGS, SS
Scarlet 6R Crystals.....	Mz .....	WGS, SS
Scarlet S.....	Math .....	WGS, SS
Scarlatol B.....	Mz .....	Lakes
Sea Blue .....	SS .....	WGS, CT
Seal Brown G.....	SS .....	CD
Serge Blue.....	O.....	
Setocyanine .....	Kell .....	SS, CT
Setoglaucine .....	Kell .....	SS, CT
Setopaline .....	Kell .....	SS, CT
Sevres Blue .....	S .....	Printing
Silk Black A.....	H .....	SS
Silk Blue.....	Mz .....	SS
Silk Blue extra greenish, JSC, IC, T, 5BNOO, T5B, T3B, TB, TR, TRL.	O .....	SS
Silk Gray O.....	Mz .....	SA
Silk Induline B.....	Mz .....	SS, CT
Silk Scarlet TB.....	H .....	SS
Silver Gray N.....	Math .....	
Sky Blue.....	JB .....	
Smaragd Green.....	By .....	
Solamine Blue B. R.....	A .....	CD
Solar Black.....	AT .....	CD
Solid Blue.....	O .....	
Solid Blue BB, BD, BL, DD, RR.....	At .....	CD
Solid Blue BD, BRD, 2BD, 3RD, 6G....	Math .....	WGS

# 312 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Solid Blue BL.....	At.	
Solid Blue R.....	Math	WGS
Solid Blue 3R.....	Math	WGS
Solid Brown O yellowish, L, NT.....	Mz	WGS, SS
Solid Green crystals, O, A1, 72780.....	Math.	
Solid Gray S.....	Math.	
Solid Green G.....	Klp.	
Solid Green J.....	SS.	
Solid Green JJO, O.....	Klp	WGS, SS, CT
Solid Green O paste.....	Mz	WCh
Solid Violet.....	Klp	WCh
Solid Yellow N.....	SS	WGS
Soluble Blue.....	Mz, Bs, BrS, Math.	SS
Soluble Blue A1.....	O	CT
Soluble Blue B.....	Bch.	
Soluble Blue 8B, 10B.....	BrS.	
Soluble Blue C1, C3.....	Sch	CT
Soluble Blue, J, M, 00.....	O	CT
Soluble Blue R.....	Sch	CT
Soluble Blue BV, 3B.....	O	CT
Soluble Blue R.....	Mz.	
Soluble Blue 3R.....	Mz, O	CT
Soluble Blue SV.....	Mz.	
Soluble Blue XG, XL.....	BrS.	
Sorbin Red.....	PK	WGS
Soudan Red I, II, III, G, R.....	A.	
Soudan Black 1, 2, 3, B, R, 2R.....	SS	WGS
Soudan Brown.....	A	CD
St. Denis Black B.....	SS	Sulphur
St. Denis Red.....	SS	CD
Stanley Red.....	ClCo	WGS, SS
Standard Blue, Brown, Cutch Shade, Fast Blue, Fast Brown, Red, Tan, Yellow, Red, Yellow.....	Me.	
Steresine Gray.....	H.	

# LIST OF DYESTUFFS, MAKERS AND METHODS. 313

Name of Dye.	Agent or Maker.	Dye Method.
Stilbene Orange 4R.....	ClCo .....	CD, SS
Stilbene Red.....	A.	
Stilbene Yellow G, 6G, 8G, 4G.....	ClCo .....	CD, SS
Substantive Pink CR.....	PK .....	CD
Sulfamine Brown A, B, D 93.....	Bs .....	WCh
Sulfanilin Black B, G.....	K .....	Sulphur
Sulfanilin Brown P.....	K .....	Sulphur
Sulfogen S, MO.....	L .....	Sulphur
Sulphon Acid Blue B, R, 3R ext G.....	By .....	WGS
Sulphin .....	PK .....	CD
Sulpho Black .....	H .....	Sulphur
Sulpho Black G, R.....	By .....	WGS
Sulpho Cyanine G, 3R, 5R, GR.....	By .....	WGS, WCh
Sulpho Cyanine Black B, 2B.....	By .....	WGS
Sulpho Green .....	S .....	WGS
Sulphogene Blue M.....	At .....	Sulphur
Sulphon Azurine D.....	Mz, By .....	WA, CD
Sulpho Yellow S.....	K.	
Sulphur Black T, T extra.....	A .....	Sulphur
Sulphur Black 2B ex, TB ex.....	A .....	Sulphur
Sulphur Black L, N, ST.....	Mz .....	Sulphur
Sulphur Blue L, extra.....	A .....	Sulphur
Sulphur Bronze.....	Mz .....	Sulphur
Sulphur Brown G, 2G.....	A .....	Sulphur
Sulphur Brown TBG, TBM.....	Mz .....	Sulphur
Sulphur Cutch G.....	A .....	Sulphur
Sultan Violet.....	H .....	CD
Sun Yellow.....	Mz, A, By, Kell, Klp.....	CD
Superfine Violet.....	KB .....	
Superior Violet ..	KB .....	
Superior New Green Crystals.....	KB .....	
Swiss Black B, BG, B2G, C, DG, D.....	SW .....	
Tabora Black R extra.....	Mz A .....	CD
Tannin Brown B.....	Math .....	CT

## 314      YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Tannin Hellotrope.....	Math .....	CT
Tannin Indigo .....	Klp.	
Tannin Orange R paste, powder.....	Math .....	CT
Tartrazine .....	Mz, Klp, PK .....	WGS
Tennyson Red.....	H.	
Terra Cotta .....	B L.....	WGS
Terra Cotta F, NF, NFG, X.....	Kell .....	CD
Terra Cotta R.....	Kell .....	WCh
Tetranil Brown R conc.....	NYB .....	CD
Tetrazo Blue, 6B, 4R, RW, BX.....	NYB .....	CD
Tetrazo Brilliant Blue BB, RR, 6B....	NYB .....	CD
Tetrazo Brilliant Green J, GDD.....	NYB .....	CD
Tetrazo Cutch Brown.....	NYB .....	CD
Tetrazo Dark Brown.....	NYB .....	CD
Tetrazo Indigo Blue D.....	NYB .....	CD
Tetrazo Lemon Yellow.....	NYB .....	CD
Tetrazo Pink B.....	NYB .....	CD
Tetrazo Purhuline R.....	NYB .....	CD
Tetrazo Sulphur Black, extra, 2B ext, R extra .....	NYB .....	Sulphur
Tetrazo Sulphur Brown G.....	NYB .....	Sulphur
Tetrazo Yellow CH, R.....	NYB .....	CD
Thiamine Yellow.....	BrS.	
Thiazine Brown G, R.....	P K.....	CD
Thiazine Red G, R.....	P K.....	CD
Thiazol Yellow.....	By, A.....	SA, CT
Thio Brown 2B, R.....	Bs .....	CD
Thio Carmine R paste, powder.....	Math .....	WGS, SS
Thio Catechine S, 1, 2, 3, 4.....	SS .....	Sulphur
Thio Chromogene.....	Mz. Bs .....	CDv
Thio Cyanosine.....	Mo.	
Thio Flavine S.....	Math .....	CD
Thio Flavine T.....	Math .....	CT
Thiogen Black D.....	Grie .....	Sulphur
Thiogene Black NA, NB, T.....	Mz .....	Sulphur

# LIST OF DYESTUFFS, MAKERS AND METHODS. 315

Name of Dye.	Agent or Maker.	Dye Method.
Thiogene Blue B.....	Mz .....	Sulphur
Thiogene Brown R, G, GG, GC, GR, GRR, S.....	Mz .....	Sulphur
Thiogene Dark Blue B, BT.....	Mz .....	Sulphur
Thion Black BE.....	K .....	Sulphur
Thion Blue B, conc.....	K .....	Sulphur
Thion Brown G, R, O.....	K .....	Sulphur
Thion Green B.....	K .....	Sulphur
Thion Violet Black.....	K .....	Sulphur
Thional Black T, TB, TR.....	S .....	Sulphur
Thional Bronze.....	S .....	Sulphur
Thional Bronze G.....	S .....	Sulphur
Thional Dark Brown M.....	S .....	Sulphur
Thional Black GTXAS.....	Lev .....	Sulphur
Thionine Blue G0.....	Mz .....	WN, SA, CT
Thionine Blue 0, 00, 000.....	Mz .....	WN, SA, CT
Thio Orange G.....	Bs .....	WGS
Thiophenol Black T extra.....	L .....	Sulphur
Thio Phloxine.....	Mo.	
Thio Phosphine J.....	L P.	
Thio Ruby.....	Bs .....	WGS
Thio Vesuvine.....	Bs .....	WGS
Thio Yellow G, RM, R.....	Bs .....	CD
Titan Black ED.....	H .....	CD
Titan Blue B, BBB, S.....	H .....	CD
Titan Brown O, R.....	H .....	CD
Titan Como G, R, S.....	H .....	CD
Titan Gold, Gray Navy Blue, Navy R, Orange N, Pink, Red, Red 6B, Scarlet C, Scarlet CB, Scarlet D, Scarlet S, Sky Blue, Yellow H, Yellow R, Yellow Y.....	H .....	CD
Tobacco Brown G, R.....	Math .....	CT
Tolan Red I, II, B.....	K .....	WGS
Tolamine Green, Violet.....	Klp .....	CD

## 316      YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
Toledo Blue O.....	Bs .....	CD
Toluidine Blue O.....	A, O, PK.....	CT
Toluylene Black G.....	O .....	CD
Toluylene Blue B, R.....	O .....	CD
Toluylene Brown, G, R.....	O .....	CD
Toluylene Dark Blue B, R.....	O .....	CD
Toluylene Orange R.....	Mz .....	CD
Toluylene Orange G, R, RR.....	O, A.....	CD
Toluylene Red or Neutral Red.....	O .....	CD
Toluylene Yellow, SG.....	O .....	CD
Toraline B, a logwood preparation.		
Triamine Black B, BT, MJ.....	Klp .....	CD
Triamine Blue BNW, MJ, MNW, TNW.....	Klp .....	CD
Triazol Blue BB.....	O .....	CD
Triazol Blue BB, 3R.....	O .....	CD
Triazol Brown B, G.....	O .....	CD
Triazol Corinth B.....	O .....	CD
Triazol Dark Blue B, 3R.....	O .....	CD
Triazol Indigo Blue.....	O .....	CD
Triazol Red 6B.....	O .....	CD
Triazol Violet R, B new.....	O .....	CD
Trisulphon Blue.....	S .....	CD
Trisulphon Brown.....	S .....	CD
Trona Red 3B, 7B, 2G.....	By .....	CD
Tropaeoline D, G.....	Math .....	WGS, SS
Tropaeoline R, Y, RN, RNP.....	Math .....	WGS, SS
Tumerine 914.....	Math .....	CD
Turquoise Blue BB, G.....	Ry .....	CT
Tyemond Orange RY.....	H .....	WGS
Tyemond Scarlet S.....	H .....	WA
Tyemond Scarlet Y.....	H .....	WGS
Union Black B, BB, S, P, BG, A.....	Math .....	CWD
Union Black SM, BS.....	Mz .....	CWD
Union Black B, D, G.....	H .....	CWD
Union Blue DC, XX.....	Math .....	CWD

LIST OF DYESTUFFS, MAKERS AND METHODS. 317

Name of Dye.	Agent or Maker.	Dye Method.
Union Blue R.....	A .....	CWD
Union Green.....	Sch .....	CWD
Union Navy Blue.....	Sch .....	CWD
Uranía Blue, B.....	Bs .....	WGS, SS
Uranine .....	Mz, A, BrS, Math, PK.	
Ursol D, P.....	Z, A.....	Fur
Vacanceíne Blue, Scarlet.....	H.	
Vat Red paste, powder.....	H .....	CD
Vesuvine B, BB, 3BM, conc., 4GB conc., extra yellow, O, RV, 2RV, 3R, su- perior .....	Mz .....	WG, SS, CT
Vesuvine B.....	P K.....	WG, SS, CT
Victor Black.....	At .....	WGS
Victoria Black B, G, 5G.....	By .....	WGS
Victoria Black.....	Mz .....	Wool
Victoria Blue B.....	Mz, Kell, Klp, Math, PK .....	WG, SS, CT
Victoria Blue BS, alcohol soluble.....	Klp, PK..	WGS, SS, CT
Victoria Blue R, 4R.....	Kell, Klp, PK.....	WGS, SS, CT
Victoria Green 3B.....	Klp, PK..	WGS, SS, CT
Victoria Heavy Blue.....	By .....	WGS
Victoria Rubine G, O.....	Mz .....	WGS, SS
Victoria Ruby.....	Mz .....	WGS, SS
Victoria Scarlet G, R, 2R, 3R, 4R, 5R, 6R .....	Mz .....	WGS, SS
Victoria Violet B, paste.....	Mz, PK .....	WCL
Victoria Violet 4BS, .....	Mz By.....	WGS
Victoria Violet 4BS, 4BSL.....	Mz .....	WGS, SS
Victoria Yellow, A, O.....	Mz .....	WGS
Victoria Yellow, conc.....	Mz .....	WGS
Vidal Black S, D.....	SS .....	Sulphur
Vidaline Blue, BB, 5B, R, RR.....	SS .....	Sulphur
Vidaline Brown B, GG.....	SS .....	Sulphur
Vidaline Green.....	SS .....	Sulphur

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Name of Dye.	Agent or Maker.	Dye Method.
Vigoureux Black I.....	Mz .....	Printing
Vigoureux Black S.....	Math .....	Printing
Vigoureux Brown B, N, SW, V.....	Math .....	Printing
Vigoureux Brown I.....	Mz .....	Printing
Vigoureux Gray I.....	Mz .....	Printing
Vigoureux Green B.....	Math .....	Printing
Vigoureux Red A.....	Math .....	Printing
Vigoureux Red I.....	Mz .....	Printing
Vigoureux Yellow I.....	Mz .....	Printing
Vilal Black .....	HSV .....	Sulphur
Violamine A, B, 3B, G, R, A2R.....	Mz .....	WGS, SS
Violet APF.....	SS.	
Violet 5B, 6B.....	By .....	CT
Violet R, RR.....	Mo.	
Violet 7B.....	KB.	
Violet 0B.....	AC .....	WGS
Violet Black.....	P K.	
Violet 5R.....	By.....	WGS, SS, CT
Violet Blue AP.....	SS.....	WGS, SS, CT
Violet C.....	SS.....	WGS, SS, CT
Violet 4RN .....	Klp.....	WGS, SS, CT
Violet 3S0N.....	SS .....	WGS, SS, CT
Violet non plus ultra.....	KB.	
Violet Resinate A.....	Math.	
Violet 118.....	HS .....	WGS
Vulcan Brown D, G.....	Klp .....	Sulphur
Walnut Brown A, B.....	Math .....	CT
Water Blue.....	Mz, By, Kell, Klp, Math, O, PK, Sch. .	
Water Blue B.....	Math .....	SS, CT
Water Blue 3BA, 2BM, BNW.....	A.....	SS, CAL
Water Blue 6 B extra.....	O .....	CD
Water Blue BS, R, RB.....	Math .....	SS, CT
Water Blue R, RC, 2R, ADR, 4RW, 5RW .....	A .....	SS, WGS, CAL



# LIST OF DYESTUFFS, MAKERS AND METHODS. 319

Name of Dye.	Agent or Maker.	Dye Method.
Water Blue L.....	A.....	SS, WGS, CAL
Water Blue 00.....	K.....	SS, CT
Water Rose B.....	Klp.....	WGS, SA
Water Soluble Eosine.....	Klp.....	WGS, SS
Wine B.....	S W.....	CD
Wool Black.....	A, PK.....	WGS
Wool Black B.....	A, Bs.....	WGS
Wool Black 4B.....	A, ACW.....	WGS
Wool Black 4BF.....	A.....	WGS
Wool Black 6B.....	A, Bs.....	WGS
Wool Black 6BW.....	A.....	WGS
Wool Black GR.....	A.....	WGS
Wool Black WC.....	At.....	WGS
Wool Blue AF.....	F1.....	WGS
Wool Blue B, 2B, R, 5B.....	A.....	WGS
Wool Blue FS.....	Mz.....	WN
Wool Blue K.....	PK.....	WGS
Wool Blue N, R extra, 5 R, B ex SR exBy.....		WGS
Wool Blue S.....	PK.....	WGS
Wool Blue SS.....	Kell.....	WGS
Wool Gray.....	Bs.....	WGS
Wool Gray, B, B double G, R.....	Klp.....	WGS
Wool Green B, BS.....	By, Klp.....	WGS
Wool Green S.....	Klp, PK.....	WGS
Wool Green SS.....	Kell.....	WGS
Wool Induline B.....	K.....	
Wool Jet Black 2B, 3B.....	A.....	WGS
Wool Red B.....	Math.....	WGS
Wool Red extra.....	K.....	WGSS
Wool Red R, G.....	PK.....	WGS
Wool Scarlet 3R.....	CDO.....	WGS
Wool Scarlet R, 4R, 37W.....	Sch.....	WGS
Wood Violet S.....	P K.....	WGS
Wool Yellow.....	PK.....	WGS
Xanthine.....	Mz, Klp.....	SS

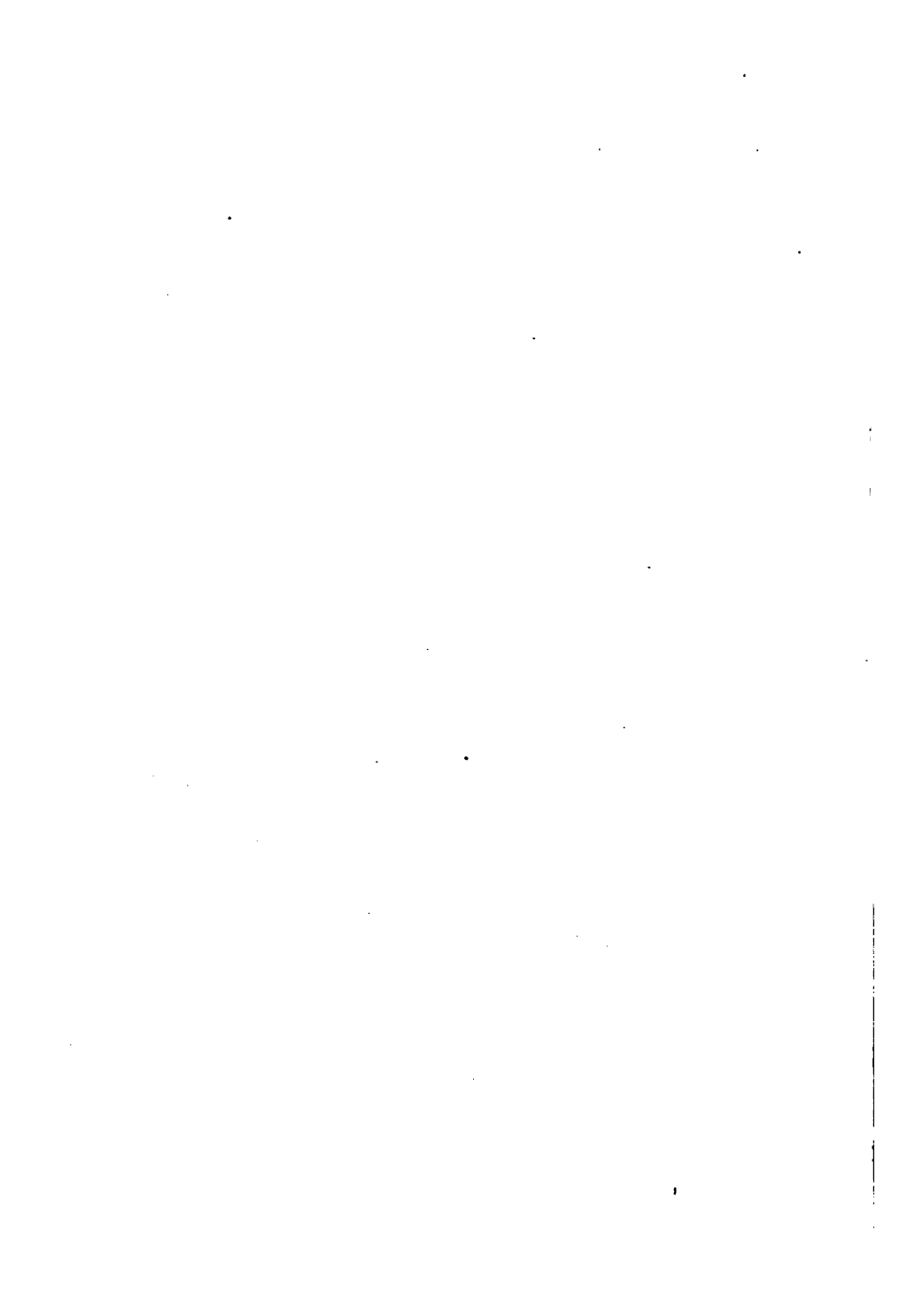
# 320 YEAR-BOOK FOR COLORISTS AND DYERS.

Name of Dye.	Agent or Maker.	Dye Method.
X L Blue, Red.....	H.	
Xylidine Orange 5572.....	Math.	
Xylidine Ponceau, see Ponceau 2R.		
Xylidine Red, see Ponceau, 2R.		
Yellow AT.....	Math	WGS
Yellow Coralline.		
Yellow Fast to Soap.....	SS.	
Yellow for Leather, O, 2a, 7, 11, G....	Mz.	Tannin
Yellow Resinate A.....	Math.	
Yellow SE.		
Yellow T.....	Klp	WGS, SS
Yellow W.....	By	WGS, SS
Yellow W R.....	Klp	CD
Yellow 5183, 521.....	HS	WGS
Yellow II.....	Math.	
Yellow N.....	R H.	
Zambesi Black D.....	A	CD
Zambesi Black B, BR, D, F, FO.....	A	CDv
Zambesi Black 2G, NA, V.....	A	CDv
Zambesi Blue B, BX, R, BX.....	A	CD
Zambesi Brown G, 2G.....	A	CD
Zambesi Gray B.....	A	CD
Zambesi Indigo Blue R.....	A	CD
Zambesi Pure Blue 4B.....	A	CD

PART VII.



MISCELLANEOUS NOTES.



## MISCELLANEOUS NOTES.

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### IMPROVEMENTS IN THE TREATMENT OF RAW COTTON AND COTTON GOODS TO REDUCE THE INFLAMMABILITY THEREOF.

W. H. Perkins and Whipp Bros. & Tod.

An insoluble, or but sparingly soluble compound, necessary for protecting the goods is formed, if the goods be treated with (a) a solution of a soluble metallic salt, or salts, such, for example, as acetate of zinc, or aluminium, or sulphate of copper, or nickel; (b) generally, but not necessarily, an agent to prevent, or retard precipitation in the bath; (c) a solution of one or more of certain soluble salts (other than those under head "a"), derived from metals, the oxides, or hydroxides, of which metals are capable of acting as acids. The discovery that soluble tungstates, which answer to the foregoing definition given under head "c," are suitable, has led to the discovery that other soluble salts derived from metals, the oxides or hydroxides of which are capable of acting as acids, can be used in place of, or in addition to, a soluble tungstate.

The following are salts which fulfill these conditions: An aluminate, such as aluminate of soda; a stannate, such as stannate of soda; an arseniate, or biarseniate; an antimoniate, such as potassium antimoniate. It has also been found that ammonia will, in some cases, answer under the head "b."

The treatment may be effected in one bath, or in more than one bath, according to the number of the salts, of the kind referred to under the head "c," which are used and their common solubility.

The following examples are given:

1. The goods are treated with an aluminate of soda solution of 20° Tw., and then are dried and afterwards treated

with a bath made up of four parts of tungstate of soda solution of 60° Tw., four parts of zinc acetate solution of 27° Tw., and five parts of acetic acid of 3° Tw., and the goods are then dried, or both dried and steamed.

2. The goods are treated with a bath containing one part of aluminate of soda solution of 20° Tw., and one part of stannate of solution of 20° Tw., and are then dried and afterwards treated with a bath containing four parts of tungstate of soda solution of 60° Tw., four parts of zinc acetate solution of 27° Tw., and five parts of acetic acid of 3° Tw. The goods are then dried, or both dried and steamed.

3. The goods are treated with stannate of soda solution of 25° Tw., and are then dried, and then are treated with a bath made up of four parts of sodium tungstate solution of 60° Tw., four parts of zinc acetate solution (or of copper sulphate solution) of 27° Tw., and one part of acetic acid of 10° 5 Tw., and afterwards the goods are dried and steamed.

4. The goods are treated with a bath made up of one part of either sodium arseniate solution or sodium biarseniate solution of 29° Tw., and two parts of sodium tungstate solution of 60°, and after drying the goods are treated with either zinc acetate solution or aluminium acetate solution or nickel sulphate solution of 27° Tw., and afterwards the goods are dried, or both dried and steamed.

5. Goods are treated in either arseniate of soda solution or biarseniate of soda solution of 29° Tw., and then are dried and treated with zinc acetate solution (or zinc sulphate solution) of 27° Tw., and afterwards the goods are dried, or both dried and steamed.

6. The goods are treated with a potassium antimoniate solution of 10° Tw., and then are dried and then treated with a bath made up of four parts tungstate of soda solution of 60° Tw., four parts of zinc acetate solution of 27° Tw., and one part of acetic acid of 10° Tw., and then the goods are dried, or both dried and steamed.

7. The goods are treated with a bath of stannate of soda

solution of 25° Tw., and afterwards dried, and then treated with a bath made up of five parts of sodium tungstate solution of 60° Tw., five parts zinc acetate solution of 27° Tw., and two parts of a solution of ammonia of .880 specific gravity, and the goods are then dried, or both dried and steamed.

8. The goods are treated with a bath of stannate of soda solution of 25° Tw., and dried, and then are treated with a warm bath of potassium-titanium-oxalate solution of 8° Tw. The goods are then dried, or both dried and steamed.

9. The goods are treated with solution of titanium chloride at 12° Tw., and then are at once, or after lying for some time, partially, but not completely, dried, preferably in current of warm air; and they are treated with a bath of arseniate of soda solution of 3° Tw. of stannate of soda solution of 5° Tw., or of tartar emetic solution of 5° Tw. The goods are then washed and dried. Previously to washing they may be passed through a bath of dilute caustic soda solution of, say, 2° Tw.

10. The goods are treated with a bath of stannic chloride solution of 20° Tw., and then, at once, or after lying for some time, are partially, but not completely, dried, preferably in a current of warm air, and afterwards they are treated with a bath of arseniate of soda solution of 3° Tw., or of stannate of soda solution of 5° Tw., or of tartar emetic solution of 5° Tw., and then they are dried, or washed and dried. Previous to washing they may be passed through a bath of dilute caustic soda solution of, say, 2° Tw.

11. The goods are treated with an aluminate of soda solution of 20° Tw., and are then dried and afterwards treated with a warm bath made up of four parts of tungstate of soda solution of 60° Tw., three parts of zinc acetate solution of 27° Tw., three parts of tartar emetic solution of 9° Tw., and six parts of acetic acid of 3° Tw. The goods are then dried, or both dried and steamed.

12. The goods are treated with a stannate of soda solution of 17° Tw., and are then dried and afterwards treated with a bath made up of eight parts of zinc acetate solution of 27°

Tw., eight parts of acetic acid of 10° Tw., warming if necessary, in order to get a clear solution. The goods are afterwards dried, or both dried and steamed.

13. The goods are treated with a bath made up of two parts stannate of soda solution of 17° Tw., and three parts of tungstate of soda solution of 60° Tw., and the goods are then dried, and afterwards treated with a bath made up of one part of tartar emetic solution of 9° Tw., and one part of zinc acetate solution of 27° Tw., warming if necessary in order to get a clear solution. The goods are afterwards dried, or both dried and steamed.

14. The goods are soaked in a bath by dissolving powdered tartar emetic in sodium tungstate solution of 60° Tw. until solution is 74° Tw., and then the goods are dried and afterwards treated with a zinc acetate solution of 27° Tw. The goods are then dried, or both dried and steamed.

15. The goods are treated with a bath made by mixing three parts of a warm tartar emetic solution of 29° Tw., four parts of acetic acid of 10° Tw., twelve parts of zinc acetate solution of 27° Tw., and eight parts of sodium tungstate solution of 60° Tw., warming if necessary to get a clear solution. The goods, after removal from this bath, are dried, or both dried and steamed.

If the goods contain "sizing" they may, if desired, be washed free from it before being subjected to treatment according to this invention. Or the treatment may be assisted by first passing the goods through a weak solution of oleine, soluble oil or glycerine. Or, when two baths are used in the treatment, a little oleine soap, soluble oil or glycerine may be added to the first bath, provided the oleine soap, soluble oil or glycerine be soluble in that bath. The following is an example:

16. The goods are treated with a bath containing fifty parts of stannate of soda solution of 27° Tw. and one part of a solution of oleine of 25 per cent. strength, or of ordinary commercial oil, or glycerine. The goods are then dried and



afterwards treated with a second bath containing four parts of zinc acetate solution of 27° Tw., four parts of soda tungstate solution of 60° Tw., and five parts of acetic acid of 3° Tw., and then the goods are dried, or both dried and steamed.

The cotton goods can be soaked in, or padded with, the solutions as may be most convenient in practice, and in treating raw cotton the operations can be conducted as may be most suitable for manipulating the material, for example, after being treated with the solutions the raw cotton can be treated in a hydro-extractor and then dried in a current of hot air. Both the drying and steaming of the raw cotton can, for example, be effected whilst it is supported in thin layers.

—*Journal Soc. Dyers and Colorists.*

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### SOLID HYPOCHLORITE OF SODA.

By Max Muspratt.

In 1898 Mr. Shrapnell Smith and the author presented a paper on hypochlorite of soda solutions (*Journal Soc. Chem. Ind.*, 1898, XVII., 1096), and announced the production of crystals of hypochlorite of soda containing 40 per cent. of sodium hypochlorite and about 55 per cent. of water. The ultimate commercial possibilities were considerable, and work has been continued upon the product with a view to making it a commercial article. Amongst many purely technical difficulties, which are being gradually surmounted, a physical difficulty threatened to make further work useless from a commercial standpoint. This difficulty was that at the comparatively low temperature of 65°-70° F. the crystals dissolved in their own water of crystallization to a slushy mass, which, in accordance with the properties of high strength solutions of hypochlorite of soda, decomposed with great speed. As this property would have once and for all made the product commercially valueless, attention was directed to the raising of this melting or dissolving point.

The first idea was to mix the crystals with a calcined soda salt, such as salt cake or soda ash. It was hoped that this would act as an absorbent of the water of crystallization and prevent the solution of the hypochlorite in this water, thus in effect raising the melting point. This expectation was certainly realized, but to so small an extent that a rise of only about 5° F. in the melting point resulted, and at that point a mixed mass of slush and solid resulted, the hypochlorite portion of which rapidly decomposed. Admixture with Kieselsguhr was next tried; as far as the melting point was concerned this was thoroughly successful, but the hypochlorite apparently acted in a similar way to a dried-up solution of hypochlorite, and was decomposed into chlorate.

The only course left was the removal of a portion of the water of crystallization, and this has been successful. Needless to say, there are considerable difficulties in doing this on a technical scale, as no heat must be used, but by the use of vacuum and a current of dry air it has been possible to make a powdery hypochlorite of soda containing from 40-60 per cent. of available chlorine, which is not extremely hygroscopic (as the crystals are), having a melting point well over 110° F., as far as can be judged, and does not decompose much more rapidly than bleaching powder.—*Journal Soc. Chem. Ind.*, 1908—591.

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### A SUBSTITUTE FOR MERCERIZATION.

In consequence of the spread of mercerization, a large number of machines have been invented and patented, few of which are satisfactory. Only a few systems have actually gained a foothold commercially. The Sellier process has always remained the same, and although various attempts have been made to produce silky lustre on cotton in other ways, no success worth speaking of has been attained. If we consider the reactions which take place in mercerization and the change in the structure of the cotton fibre we cannot help conceiving

that it would be possible to obtain the effects in a simpler fashion. Mercerization is complicated and usually requires a complicated and costly plant. The necessity for five operations—scouring, mercerizing, souring, rinsing and drying—makes the process somewhat expensive, irrespective of defects in yarn and fabric, easily caused by careless handling, and which do not show till the goods are dyed. The increased affinity of mercerized yarn for dye makes very careful dyeing necessary, and if the mercerization is not thoroughly and properly done the above-named defects appear.

Mercerization has now found a substitute in a new process, which gives the cotton a distinctly greater lustre and is as simple as well can be. As the patent is not yet quite completed, I will go into details later, and confine myself to a general note of what the new process will effect.

In contrast to the present process, the cotton is treated raw, or as spinning preparation, instead of being mercerized in the yarn or in the piece. The plant needed is very simple, and the working is considerably simplified. The machine in which the cotton is treated turns out 4,000 to 5,000 pounds in ten working hours, works wholly automatically, and is managed by a single man. The new process is ten times cheaper than mercerization itself, and produces a uniform, lustrous, soft material which spins splendidly and causes absolutely no waste. The first thing to be considered is the cost of production, and this important point speaks decidedly in favor of the new process, independently of the fact that the result is better than is obtained by mercerization. It is clear that the material when treated in the unspun state must give better and more salable cloth than yarns treated after spinning. The numerous baths of lye, acid, rine, etc., by no means improve the threads, but on the contrary make them more or less frayed, so that it not infrequently has to be passed. The threads, too, are often broken, so that there is much waste.

The new process is based upon an entirely new theory. The excessive stretching is avoided, and instead of caustic soda-

lye other analogous chemico-mechanical means are used, and give the threads the desired silky lustre. These operations are all carried out on the same machine, so that as soon as the goods leave the machine they can be spun at once. The finished thread feels softer and more silk-like than mercerized thread.

Its elasticity is very great, a point in which mercerization is deficient, but the strength is not so much increased as in mercerization. There is nothing new of importance in the dyeing. It is true that the dyeing is not so speedily done, as there is not so much increase in affinity as in mercerization. but the levelness of the shade is not subject to so many vicissitudes.

The more important point is that the finished thread has a much higher lustre than with mercerization, and that the new process is as suitable for American and short-stapled cotton as for long-stapled. These, too, receive marked silky lustre, but it must be expressly stated that it gives a much better result with long-stapled than with short-stapled cotton. The enormous cheapness of the new process will make lustrated cotton an article of universal use, and the method will undoubtedly be a severe competitor of ordinary mercerization, and the more so as the operations are much simpler and the plant much cheaper. It is certain that in a short time a process offering so many advantages must make its way in the trade, especially as the invention justifies itself in practice.  
—*Textile Colorist.*

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### QUILLAIA.

Quillala (derived from the Chilian verb "quilloan," to wash) is the name of a genus of exotic Rosaceae growing in Chile, Peru, and South Brazil. The genus, of which there are several species, consists of large evergreen trees. The bark of these furnishes infusion, is used for washing and for promoting the

growth of the hair, is variously known as quillaia bark, soap bark and Panama bark or wood. In nearly every case it comes from *Q. Saponaria*, a white-flowered tree which grows to a height of fifty or sixty feet.

The useful ingredients of the bark are two in number. The chief is saponine ( $C_{27}H_{44}O_{13}$ ), otherwise called "senegin," a glucoside of sapogenine ( $C_{14}H_{22}O_2$ ). Saponine is got from quillaia bark by extraction with boiling alcohol. Unless purified by chrystallization it contains a highly-poisonous salt called sodium quillaiate, in very minute quantities, however. This sodium salt is a violent irritant, and, owing to its presence, crude saponine causes violent sneezing.

Saponine has great lathering and cleansing power, and also great emulsifying action on oils. In this second effect it is assisted by pectin, the second constituent of the quillaia bark above referred to. The oil is merely emulsified, and is not saponified, and the emulsion does not separate on standing. Alcohol, however, at once causes the oil to separate and collect on the surface.

One of the chief recommendations of saponine is that it has no effect even on the most delicate dyes, but its detergent effect is certainly inferior to that of soap. Soxhlet strongly recommends it for wool and half-wool, but Grothe, while admitting its usefulness for fabrics dyed with loose dyes, rather disparages it on the whole. It is often mixed with soap.

For washing purposes the clear solution got by macerating the crushed bark in cold soft water is used. The solution must be kept in well-closed vessels, as the action of the air renders it turbid.

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### NEW ZEALAND FLAX.

The leaves of the New Zealand flax (*Phormium tenax*) have been worked up hitherto only to a material suitable for cordage and coarse sailcloth, but no fibre capable of being spun for the manufacture of fine fabrics has been obtained from these

leaves. Recently, however, a German chemist has discovered and patented a method of working the fibre and spinning from this New Zealand flax.

The manufacture is conducted as follows: The brown edges are removed from the fresh green leaves and the latter are boiled in a solution of an alkaline salt, for which purpose they may be conveniently tied together in bundles. Suitable salts are borax, soda or sodium bicarbonate. In particular it has been found advantageous to boil the leaves for one hour in a solution containing 0.5 per cent. of sodium bicarbonate, about 8 litres of such solution being used per kilogramme of leaves. The moist and warm leaves are then beaten with wooden hammers until the parenchyma has been loosened and opened up. To separate the parenchyma from the fibres the mass is next washed in warm soap and water and the fibres afterwards heckled. The product is now suitable for spinning, which is best performed while the fibre is moist.

The fibre thus obtained is white and applicable for fine fabrics, being characterized by great strength. The separate operations in the process described above are well known in the treatment of textile fibres, but the manufacture as a whole for the first time renders possible the production of a fibre from New Zealand flax which is applicable for making the finer kinds of fabric. Moreover, the yield of fibre is said to be considerably higher than that obtained by other methods.—*Textile Manufacturer.*

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#### DETERMINATION OF THE FASTNESS OF COLORS.

The author, Dr. von Georgievics, recommends that the trials for fastness should be carried out on a small scale in the same manner as the practical operation, but at present there is no standard of tests. An agreement on this subject would be better for all parties concerned, and the author proposes a scheme so that these operations may be carried out on the same plan. Laboratory tests will give a correct idea, rela-

tively, how the colors will act in a practical way, and should, as far as possible, be made under the conditions to which it is presumed the colors would be exposed.

It is not only the method of making the tests for fastness that must be regarded, but also the manner of dyeing, the depth of the shade and the nature of the dyed material. It must be remembered that fast colors will not result unless the proper dyeing method is used and the material properly washed, and the different depths of shade of the same dyestuffs will show different degrees of fastness under the same circumstances.

That dyestuffs react differently on wool, cotton and silk is evident, but it is not a fact commonly known that the fastness of a certain dye may vary on the different varieties of wool.

These tests for fastness should be comparative, and in some cases they are worthless without a standard of comparison, as, for example, in testing against light, and these comparisons should be made in most cases with commercial competitors and not with an absolute standard. For instance, a red acid dye for wool should be compared with azo acid magenta or azo carmine and not with alizarine red.

#### TESTS FOR WOOL COLORS.

It is necessary to consider the following properties for these dyestuffs:

1. Fastness to fulling.
2. Fastness to alkalis.
3. Fastness to water.
4. Fastness to boiling or finishing.
5. Fastness to carbonizing.
6. Fastness to perspiration.
7. Fastness to stoving.
8. Fastness to light.
9. Fastness to ironing.
10. Fastness to rubbing.

**Fastness to Fulling.**—In this case two questions arise—alteration of shade and bleeding into the white. These tests are better carried out on yarn, and on a small scale it is difficult to reproduce the conditions of the practical operation, because the contact is not as close and the milling is not as strong as it is with the woven material. Nevertheless, a positive opinion can be formed in regard to the fastness to fulling of colors, especially if they do not stand the operation, because in this case it is certain that they cannot be used in a practical way in the fulling machine.

The testing process is as follows: A solution is made of ten parts of soap and one-half part of soda to 1,000 parts water. Before using, it is warmed sufficiently to make it fluid. The yarn, after dyeing, should be thoroughly washed and braided or twisted with white cotton and the samples soaked in a soap solution and hand-fulled for one-quarter hour.

The sample is then divided into two parts. One is thoroughly rinsed and left wet over night; the other part is soaked in a soap solution, and, without washing, allowed to stand for one hour. The two parts are then well washed, and from these the change of shade and bleeding can be estimated. Colors perfectly fast to fulling should show no change with either of these tests.

**Fastness to Alkalies.**—It is well to try several tests.

1. Letting the sample lie for several hours in a cold solution of sodium carbonate 2-3° Be.
2. Wetting the dry braids with a strong solution of soda and allowing to dry.
3. In the same manner with ammonia.
4. With milk of lime.

The first trial is a practical repetition of the fulling test. The tests with soda, ammonia and chalk are to show the resistance to the effect of street dirt. The best test is that with the caustic lime. After the milk of lime is thoroughly dry it is brushed off the spots which have been wet with it, and any change of color can be observed. In the special case of blue



for Italian military uniforms, supposed to be dyed with indigo, it is necessary that they should resist the action of a boiling solution containing soap, ammonia and carbonate of soda.

**Fastness to Water.**—This is often understood to mean the action of the colors in wet finishing, but the author intends to designate the resistance to such washing as follows dyeing. Some pay no attention to this point, but the author claims that it is important, as a slight bleeding or washing off, especially in combinations of colors, produces serious change of shade. Acid dyes which are principally affected by this treatment stand the rinsing well as long as acid from the dye bath remains in the material. When this is washed out, especially in the case of hard water, some dyestuffs partially dissolve, and the shade is more or less changed; for example, mode colors obtained with blue, red and yellow often become redder in shade.

In testing the fastness to water, it should be done by a combination mode color; for example, a yellow color should be mixed with a red and blue and the test washed in running calcareous water for one-half hour.

**Fastness to Finishing.**—In making this test the dyed yarn is mixed with white wool and cotton and boiled in water for one-half hour. This, perhaps, for wool colors, is the most severe test. In many cases it is necessary to add a little acetic acid to get at all favorable results. To test the resistance to dry finishing, a piece of goods containing the dye is wound on a small laboratory steam-shell and tested for one-half hour with dry steam. Light shades, particularly blue, are often changed indirectly by this treatment, as, if it is very severe, the wool itself is changed to a yellow shade; hence it is necessary to treat a portion of the white wool in the same way in order to see how much the shade is changed.

**Fastness to Carbonizing.**—The sample is mixed with white wool and wet with sulphuric acid 4° Be., squeezed out and dried at about 170° F., and then neutralized with carbonate of soda 2-4° Be. and thoroughly washed. The change of shade

and bleeding are the points to be observed. Often the fastness to acid is also tested by wetting the dry material with a 10 or 15 per cent. hydrochloric acid and letting it dry, but the result is not definite. For indigo blue shades on military goods a severe test is carried out in several countries. In France and Roumania a sample must stand boiling one minute in sulphuric acid 10 per cent. without change of shade or the liquor becoming colored.

**Fastness to Perspiration.**—The ordinary test here is not reliable. It is recommended to soak the sample, mixed with white wool and cotton, for several hours in acetic acid 2-3° Be., dry, and repeat operation two or three times. The change of color and the bleeding into the white are the points to be observed, but the practical results of this test are not good.

**Fastness to Stoving.**—The dyed yarn, mixed as usual with white wool and cotton, is soaked, and without rinsing, is exposed to the action of sulphurous acid gas.

**Fastness to Light.**—This test must be made comparatively. For a standard, a dye of the same shade is selected, of which the fastness to light is known. The best material is filled wool piece goods. The two samples are fixed side by side on cardboard and half of each protected from the action of light, and the whole is then exposed in a place as free as possible from dirt and injurious gas, as sulphurous acid, ammonia, etc. By comparison of the exposed parts and those which have been protected the change of shade may be observed from time to time and the exposures kept up until the dyes are completely faded. In some cases the light acts only for a time, and then ceases to be any positive action. According to the alterations of the color, the fastness to light can be judged. It is necessary to remember, however, that the change of shade from exposure to light is much more disadvantageous than if the shade merely becomes lighter.

Some dyes, for instance azo yellow, picric acid, etc., appear darker after short exposure, and a close examination is necessary to show that they have lost any color.

**Fastness to Hot Ironing.**—The material is pressed with a hot iron, and in the case of certain colors it is necessary to allow them to stand for some time, as shades which are altered by the iron may come back to the original after a time.

**Fastness to Rubbing.**—The dyed sample is rubbed vigorously on white linen, and shades absolutely fast to rubbing should not stain it.

#### TESTS FOR COTTON COLORS.

The test for fastness to light, perspiration and rubbing are the same as for wool, and in addition to these it is necessary to make the following trials:

1. Fastness to washing and soap.
2. Fastness to water.
3. Fastness to lye.
4. Fastness to acid.
5. Fastness to chlorine.
6. Fastness to ironing.

**Fastness to Washing and Soap.**—The fastest dyeings on cotton should be treated for one hour in a boiling bath of two to three parts soap and two to three parts soda in 1,000 parts of water without changing the shade or bleeding into the white cotton. The latter condition is not required but for the very fastest colors. The colors which are less fast should stand a treatment of one-quarter to one-half hour in a soap bath of two to three parts to 1,000 parts at 95° to 100° F.

**Fastness to Water.**—The colored sample braided with white wool and cotton is boiled one-half to one hour in distilled water. This test shows whether it is possible to use this color on cotton in half-wool goods where the dyes are required to stand roll boiling.

**Fastness to Lye.**—This test is used to determine whether the color can be used in goods as for ecru or colored stripes which are bleached in the piece. This is made by boiling the colored samples braided with white for one hour in a solution of caustic at 3° Be.

**Fastness to Acid.**—The colored cotton twisted with white wool is boiled one hour in a bath containing one part of sulphuric acid and two and one-half parts sodium sulphate to 1,000. This trial shows whether the color is suitable for use in mixed goods in which the wool is dyed with the acid color after weaving.

**Fastness to Chlorine.**—The dyed samples are soaked for one hour in a solution of calcium hypochloride. If the colors are to be tried in regard to their fastness to chlorine, as it is used after printing, the trials should be made on printed samples. The solution of hypochloride acts less strongly on printed than on dyed colors on account of the thickening which is used in the formula.

**Fastness to Ironing.**—This test is made by ironing the samples both dry and moistened; any change of color can be observed.

#### TESTS FOR SILK.

Tests for fastness on silk are not important, and are rarely used. The main points are fastness to light, rubbing and water, and sometimes to stoving.

The fastness to water is tested by soaking the dyed sample for several days in distilled water. This should show no coloration at the end of the time.

The test for fastness to washing is made by treating a sample side by side with wool and white cotton in a light soap bath at 100°. For the other tests, light, crocking, etc., the methods are the same as for wool.—*Translated from Zeit. für Farben und Textil Chemie.*

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#### THE WORKMAN IN THE ANILINE INDUSTRY.

##### How a German Color Works Looks After the Welfare of Its Employees.

In considering the question of the welfare of the workmen, the first point of interest is the number of persons concerned.

At the Farbwerke-vorm. Meister, Lucius & Bruening, at Hoechst, 4,500 men, with 150 overseers, are employed. The average wages for special workers is 4 marks per day, and for laborers 3.35 marks per day. At Christmas time a present is given to each, based upon the length of employment and the value of the services rendered. In the year 1902 these presents amounted to 74,870 marks.

The corporation also gives its workmen the benefit of such transactions as can only be undertaken by the use of large capital. For instance, it sells coal to its workmen on the basis of the cost of the total consumption, and in the fall buys produce, flour, etc., under favorable conditions, and retails these to the workmen at the same price, payable in monthly installments.

The widows of the workmen are cared for as far as possible; they are employed for cleaning, washing and sewing about the works. Their sons, upon application, are taken as young workmen or apprentices, as the case may be, and the girls are employed in the pharmaceutical shipping department or in the bookbindery. Workmen who are unable to do full duty are employed in the shipping department until such time as they may be entitled to pensions.

The various means devised for benefiting the workmen may be better described under their respective designations:

The Department Sick Relief Fund.—This fund is raised by contributions from the men and the company. The workmen contribute  $1\frac{1}{2}$  per cent. of their wages, up to 4 marks, and the company adds one-half to this amount. This fund has a reserve of 131,000 marks.

The usual sick benefit is 60 per cent. of the wages, up to 4 marks. In cases of special need the company makes up the full amount of the wages.

In cases of fatal ending of sickness the survivors are paid a death relief of twenty-five times the amount of wages, and in case of death of a wife the husband receives half this amount.

Various means for relief in case of illness are provided, and patients are sent to such different water-cures as may be advisable.

The company employs relief physicians and maintains a sick-bay for the immediate relief in cases of accident or sudden illness in the works.

The Kaiser Wilhelm and Augusta Fund.—This fund was started in the jubilee year of Emperor William I. and Empress Augusta, by Messrs. Meister, Lucius & Bruening, with a capital of 150,000 marks, and at the end of 1902 it amounted to 1,634,000 marks.

The object of the fund is:

To provide pensions for invalid members, their widows and children.

To grant loans from the capital up to the amount of 3,000 marks, against collateral security.

To grant small loans up to 100 marks on notes.

The total amount of loans made must not exceed 25 per cent. of the capital; the remaining 75 per cent. must be employed in other ways.

The membership of the fund comprises both overseers and workmen who have been constantly in the employ of the company for five years. Their number is now about 2,000, and they make no contributions. In some cases loans are granted also to those not members who have worked at least one year for the company.

The amounts of the pensions are not based upon the wages received, but upon the following schedule: A uniform daily wage of 2.50 marks is assumed, and upon this basis the pension of an invalid workman is so calculated that after five years of service 20 per cent. of this daily rate is allowed, and 2 per cent. added for every year thereafter. The amounts average as follows:

After 5 years' service, 150 marks annually.

After 10 years' service, 225 marks.

After 20 years' service, 375 marks.

After 45 years' service, 750 marks.

Widows receive 50 per cent. of the husband's pension, and each orphan until the age of fifteen receives an additional 10 per cent. In case of the death of both parents each child receives 15 per cent. of the father's pension. At the end of 1902 pensions were paid to 63 invalids, 133 widows and 170 orphans.

The Overseers' Pension Fund was started in the year 1893 with 100,000 marks, and at the end of 1902 it amounted to 307,000 marks. The number of members is 151. Widows receive one-half the pension of the husband, or of what he would have been entitled to.

The Savings Bank was started in 1894. Deposits up to the amount of 1,000 marks draw interest at the rate of 5 per cent., above that 3.3 per cent. The number of depositors at the close of 1902 was 1,702, and the amount of deposits 560,000 marks.

Relief Fund.—Under this head the directors set aside each year a large sum of money which finds ready use in special cases of need.

Bath Houses.—Owing to the nature of color manufacturing, proper means for bathing is one of the necessities of the workman. At Hoechst this idea is fully carried out. Twenty minutes of working time is allowed for this purpose daily. Warm tub baths and shower baths with all the necessary conveniences are provided. When the new bathhouse, now in course of construction, is finished, the total equipment will be 400 bath tubs, 200 shower baths and 2,000 washing places.

Restaurants.—Two restaurants are provided, in which the workman can obtain well-prepared and nourishing food at a very low cost.

The General Store.—This store carries a general line of merchandise. It was started in 1884. In 1894 a larger building was erected, and the business in 1902 amounted to 700,000 marks.

Workmen's Houses.—The building of these houses was begun in 1875. In the year 1899 there had been 380 dwellings built, and with the later additions this number has increased to 536.

The amount of the rent varies from 2.30 marks per week for a small dwelling of two rooms, kitchen, cellar, shed and garden, to 4.20 marks for a large house of three rooms, two chambers, kitchen, cellar, shed and garden. While these houses are mostly in pairs, the gardens are separated, so that each family lives by itself.

At Hoechst the houses are supplied with city water and with gas from the works of the Farbwerke. The average rent is 15 to 18 per cent. of the ordinary wages. Considering the accommodations provided, this is very low, when compared with with other places, where from one-fourth to one-third of the wages is required for rent.

In 1899 a new corporation under the name of "Gesellschaft zur gemeinnuetzigen Beschaffung von Wohnungen" (Mutual Building Loan Association) was started with a capital of 2,000,000 marks. This was formed to take over all the overseers' and workmen's dwellings and to undertake the erection of new ones on a larger scale. This is a subsidiary corporation of the Farbwerke, having its office in their building, and the directors being chosen from officers of the Farbwerke.

At Zielsheim, about half an hour's ride from Hoechst, this company has built 156 dwellings. At the Paris Exposition in 1900, a workman's house, built on the Hoechst model, was awarded the "grand prix."

The Schoolhouse at Zielsheim.—This is a two-story building, with eight large classes.

The Dormitories.—The building of dormitories for single and married workmen whose families live at a distance was begun in 1888 and continued so that now several houses have been erected. The rent is 1 mark per week.

A School of Domestic Economy was started in a new building in 1894. The pupils are daughters of the workmen, who remain one year in the institution in charge of two experienced teachers. Cooking, washing, ironing, dressmaking, general housework, etc., are taught. The tuition is free of all charges.

Baths for Women and Children.—There are fourteen bath-



rooms with enameled tubs and showers. These baths are open daily, except Sundays and holidays, and are free of charge to the wives and children of the workmen.

Company Band and Singing Society.—Nearly fifty of the employes of the company play the various instruments of a military band. This has been organized under the direction of the officers of the Farbwerke. A full military band and a small string orchestra has been equipped by the company, and the necessary music and place for practicing provided. This band, together with the string orchestra, is the official musical organization of the Farbwerke, and a music hall of suitable proportions has been built for concerts. Besides these there is a fully organized singing society.

The Library is for the free use of all the employes. It comprises about 10,000 volumes, conveniently arranged in a large, commodious special building.

The Home for Convalescents.—This is one of the latest additions to the beneficial institutions. It is located at Soden, in the Taunus. While the building is not new, it is conveniently situated, and has been refitted and properly arranged for the purposes intended.

Workmen's Homes.—This section differs from the former in that it relates to an endowment by Messrs. Meister and Dr. Lucius. The idea is to provide homes for overseers and workmen who have completed twenty-five years of service. These are given to them rent free for the remainder of their lives, and it does not matter whether they are in active service or invalids.

These buildings consist of sixty single houses, scattered over an area of seven and one-half acres, laid out like a park, with trees and shrubbery. The houses are of various sizes, according to the needs of the tenants.

It is planned to make an addition of twenty buildings in a recently-purchased plot of fourteen acres. The funds for this were furnished by the Board of Directors personally, as a

memorial to Dr. E. Lucius, and the amount subscribed was 100,000 marks.

These short descriptions of the various beneficial organizations show how the workmen at the Farbwerke are cared for, and provision is made for any accident that may occur.

It will be seen that the Farbwerke offer every inducement to their workmen to be faithful in their service and to strive to retain their positions, by giving them the assurance that their welfare is considered, not only during their active service with the company, but also when old age overtakes them or sickness or accident disables them. They are not left to their own resources or dependent upon the charity of others.

It is by no means unusual to find in every department, from the highest to the lowest, men who have been with the company continuously for from thirty to forty years, who feel a personal pride in the development and growth of the Farbwerke and the industry which it so largely represents and has done so much to develop, and that each of them individually has been a factor and a part in that development. It is this spirit, while co-operative and still not paternal, inasmuch as it does not in any way interfere with the personal privileges or views of the workmen, that has made the population of Hoechst-on-the-Main and the surrounding villages, which means practically the employes of the Farbwerke-vorm. Meister Lucius & Bruening, one contented, industrious and self-respecting community.

PART VIII.

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INDEX.

THEY TALK

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AND

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